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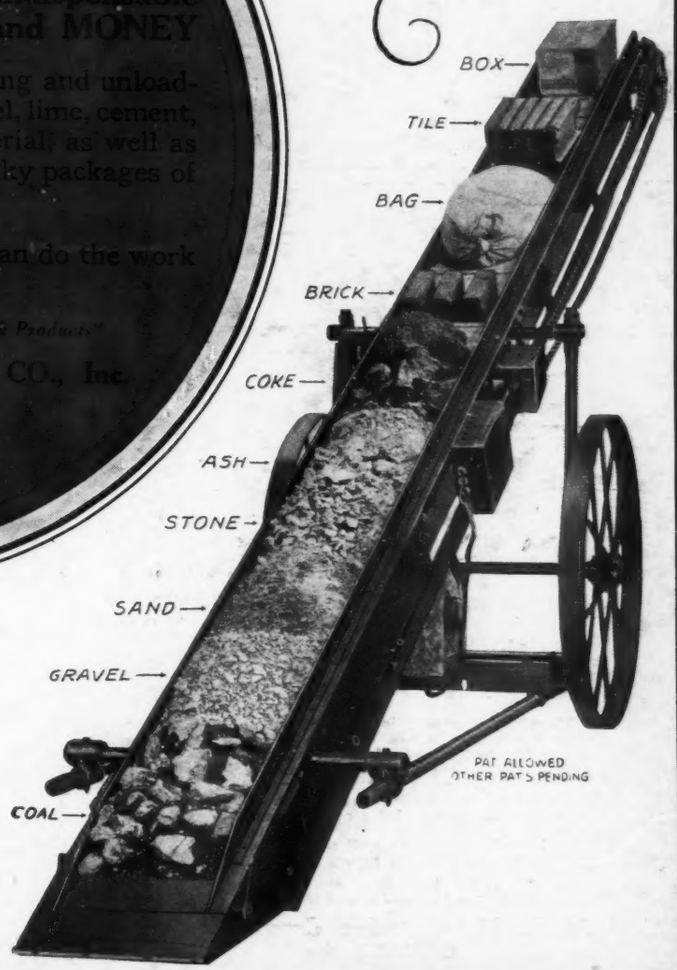

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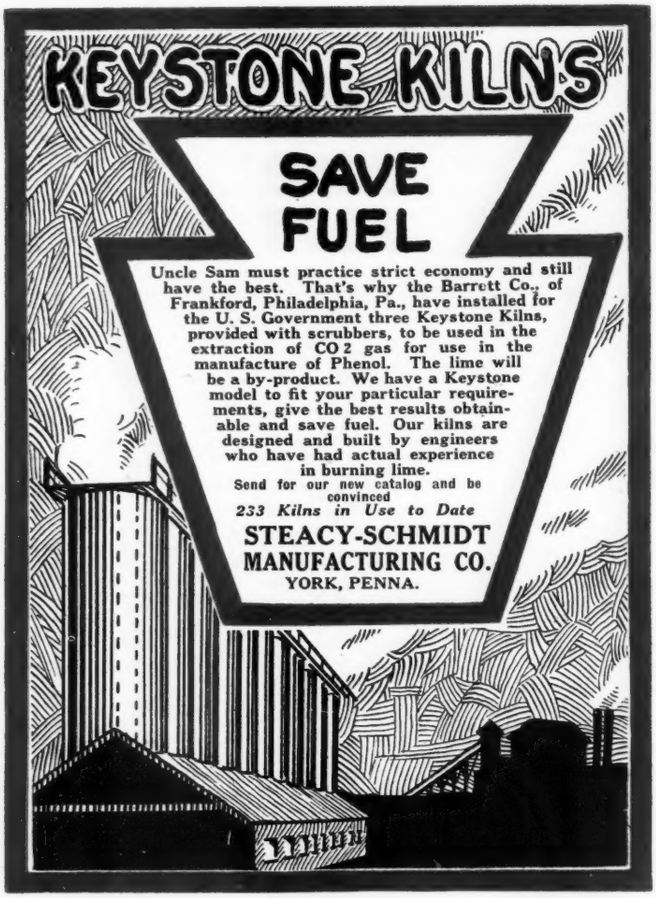

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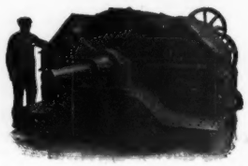

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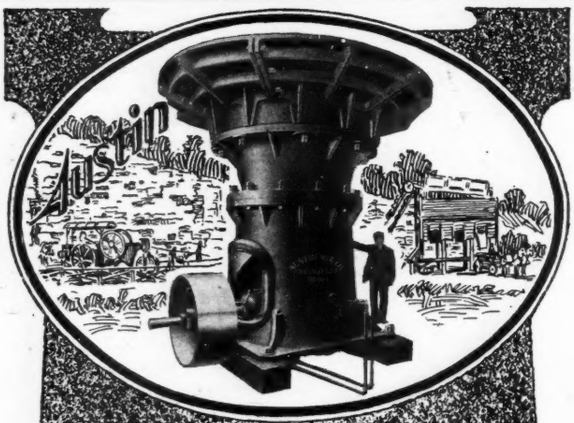

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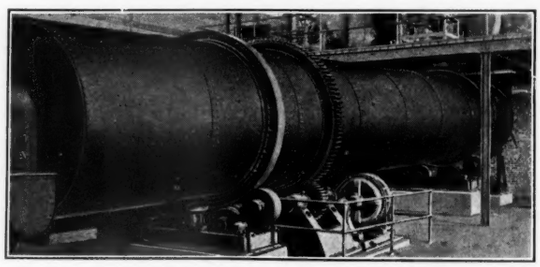

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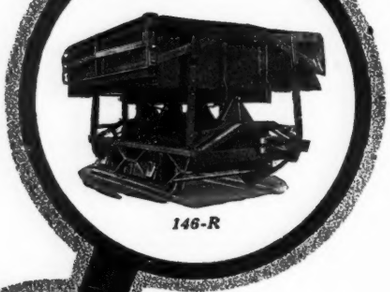
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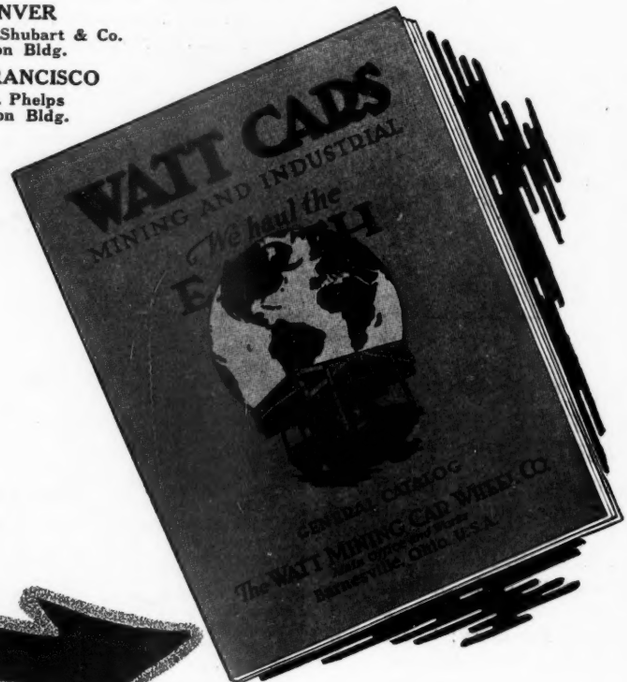

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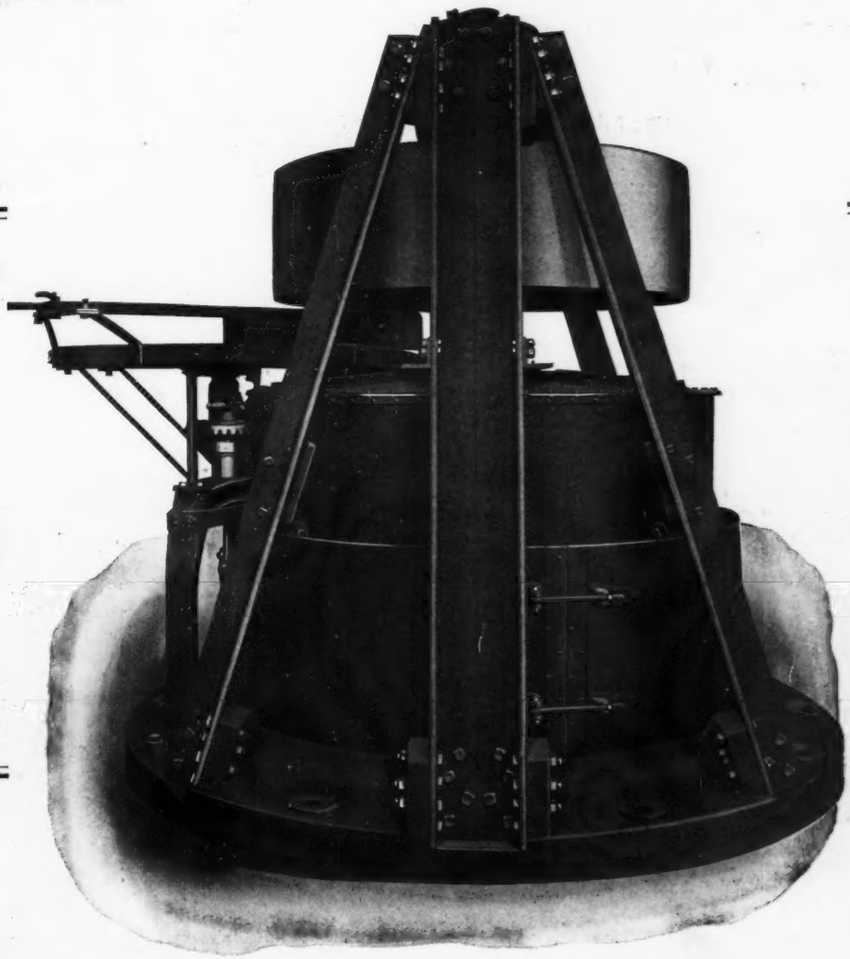

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Increases the output of any tube mill — Saves Labor — Simplifies the Plant

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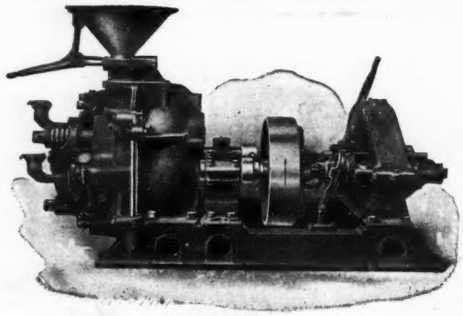

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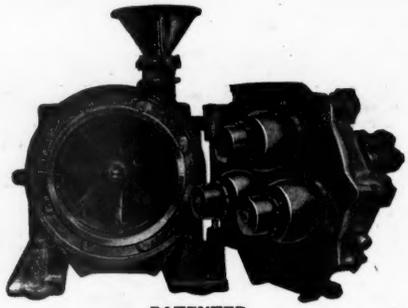

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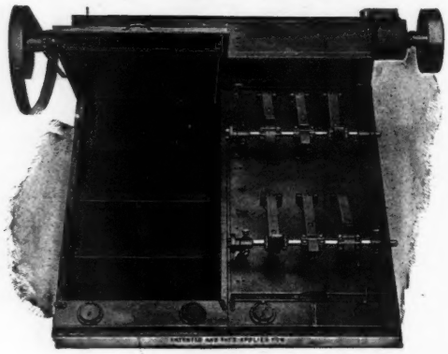

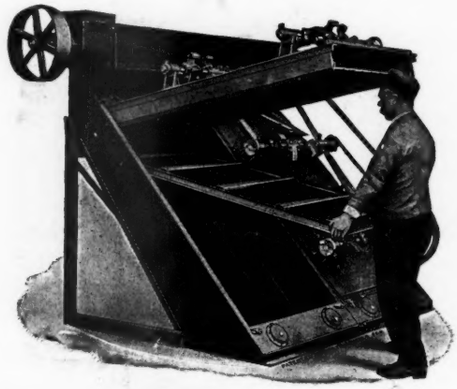

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Accessibility, such as this, has heretofore been unknown.

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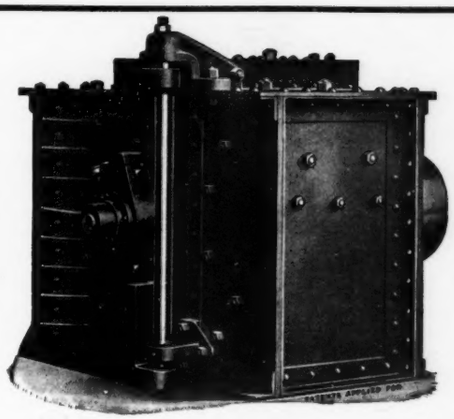

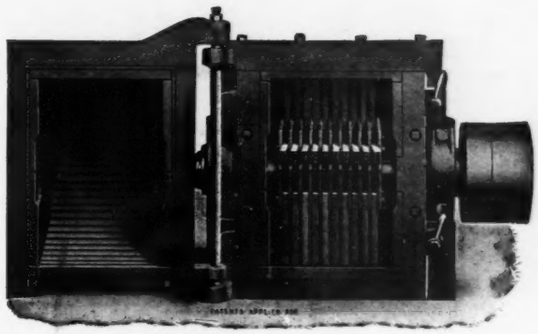

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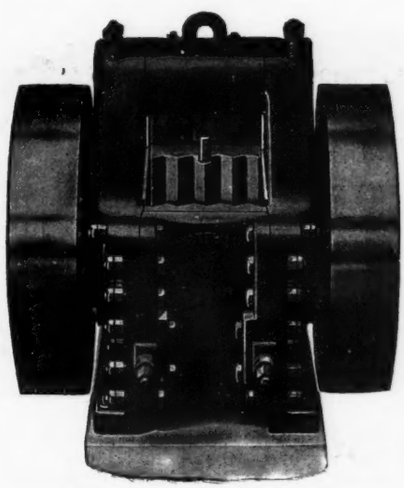

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Range of Output—6" to ½".

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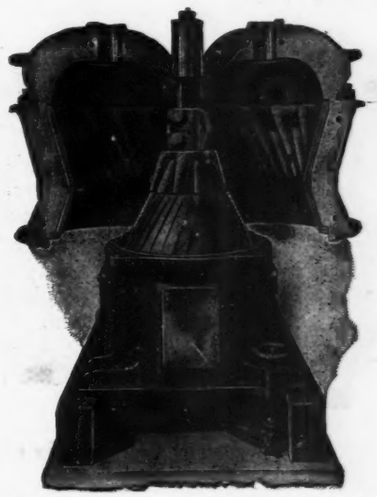
Intermediate Crushers—Output: 1" to 1½".
Fine Crushers—Output: ½" to 1".



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Sizes—Five. **Capacities**—½ to 20 tons per hour.

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This money has provided a home for two million boys over there and for another million on this side.

It has built and equipped 538 huts in American cantonments, 550 in France and the building is going on at the rate of 100 a month.

It has rented great summer hotels at French resorts for the use of the boys on furlough.

It has provided canteens or stores both here and abroad, where the comforts of life are sold at cost.

It has printed and distributed 2,500,000 Testaments, 350,000 song books and 5,000,000 pamphlets.

It has provided educational lectures attended by more than a million soldiers and sailors a month.

It has organized twenty-five theatrical companies, who travel the "Y" circuit all of the time.

It sends 15 miles of moving picture films to France every week.

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It has put "Y" workers on the troop trains, on the transports, at the firing line, in the prison camps—keeping in touch with the boys all the way, ministering to their needs, helping them fight loneliness and idleness—the worst enemy our boys are called upon to face.

Four allied activities, all endorsed by the Government, are combined in the United War Work Campaign, with the budgets distributed as follows: Y.M.C.A., $100,000,000, *Y.W.C.A.,* $15,000,000, *War Camp Community Service,* $15,000,000, *American Library Association,* $3,500,000.

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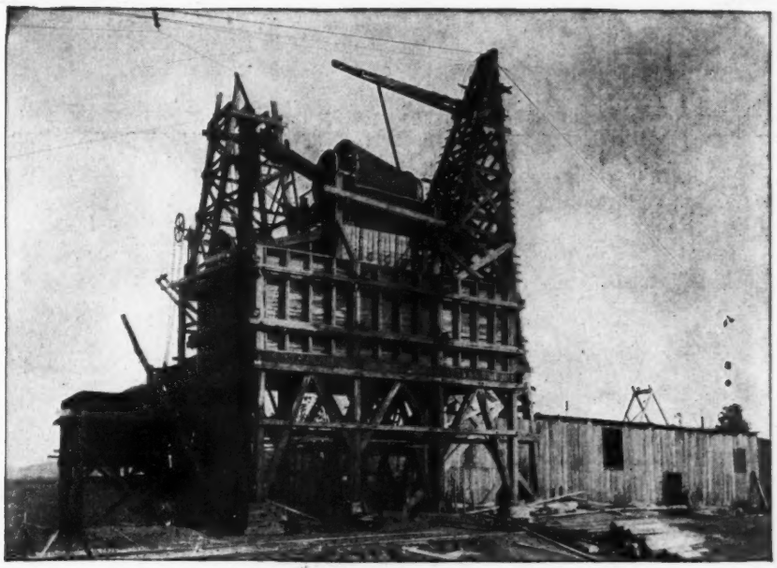

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Machinery for Conveying, Elevating, Screening, Washing, Storage and Power Transmission

Good Machinery Pays

Good machinery helps get out a better and more uniform product, that can be sold at a better price.

Such equipment cuts down the working force or increases production.

So there are two gains for the operator:—handling costs are less and per ton receipts are greater.

Good machinery pays.

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The company has a clean record of over forty years' steady growth.

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The Webster M'f'g Company

Tiffin, Ohio

New York **Chicago**

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All about Traylor Gyratory Crushers in Bulletin R-G-4. A post card will bring it

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Main Office and Work, ALLENTOWN, PA.

NEW YORK CHICAGO LOS ANGELES SPOKANE

It gets immediate attention if you mention ROCK PRODUCTS.

Rock Products

Vol. XXI Chicago, November 6, 1918 No. 14

The Committee on Mineral Aggregates

Not an Association; Its Work Does Not Take the Place of National Association Work; Has Proved Greater Need for the Associations

HAT confusion should exist in the minds of many operators respecting the relations of the Committee on Mineral Aggregates, the National Association of Sand and Gravel Producers and the National Crushed Stone Association is natural. Some may even question why it is necessary to support all three organizations, especially in hard times.

Had the crushed stone, sand and gravel industries been adequately organized, there would indeed have been no necessity for the third organization. In other industries which were well organized the national organizations assumed the work and financial burdens of their respective War Service Committees. On the other hand, the sand, gravel and crushed stone industries were not sufficiently well organized to be able to prove their ability to represent all producers, or sufficiently financed to carry on the work expected of War Service Committees. Hence they were compelled to adopt the expedient of a third and distinct organization to carry on the war work.

Consideration of these facts alone ought to bring home the importance of real national associations. By such associations the producers of mineral aggregates would undoubtedly have been able to avoid many of the snubs and knocks they have received at Washington, and would now be maintaining their war service committee, or, possibly, committees, as adjuncts of their national associations instead of carrying it as an extra burden.

The work of the War Service Committee on Mineral Aggregates is to furnish a point of contact between the industries and the Government, and to furnish a clearing house where the war problems of the industries can be handled in a lump. To carry out this work is going to require a budget of $35,000 or an assessment of one-half mill per ton on the 1917 production of mineral aggregates.

Naturally, every producer wants to know what he gets for the payment of his assessment. As to direct benefits, every producer, with the exception of those actually in war work, might as well make up his mind first as last, that he won't get anything. He will get the satisfaction of knowing that he has contributed his share to the expense of maintaining our WIN-THE-WAR INDUSTRIAL ORGANIZATION. His assessment is a legitimate tax for this purpose, and since the Government has asked it, he will pay it cheerfully.

Aside from the satisfaction of knowing he has done his duty as a patriot, the mineral aggregates producer will find that he has derived some valuable indirect benefits from the formation and work of the War Service Committee on Mineral Aggregates. Chief of these is the fact he has met other producers, found that they had problems in common, has seen that they had troubles in common, but also has seen that these could not be rectified by any one of them individually. In short, he should have found out that co-operation through association organization can be made very useful to him.

If this is the case, the money spent in assessments for the work of the Committee on Mineral Aggregates will be well and profitably spent. The individual producer will then turn to his National Association and give his support more freely, more cheerfully, and with more confidence in its ability to serve him. For, unlike the War Service Committee on Mineral Aggregates, the work of the National Associations is not hedged in with official restrictions and will not end when the war ends. Really, their work will then commence in earnest.

When the piping times of peace come the operator who prides himself on his business ability will not likely refuse any business advantage, and membership in one or the other National Association, if they are alive to the situation and opportunity, ought to be a very considerable business advantage.

Work of the War Service Committee on Mineral Aggregates

What to Do About Plant Operation After November 1 and Other Questions Discussed

PROBABLY every operator of a crushed-stone and gravel plant which is not working directly or indirectly on some Government contract is puzzled to know his present status. Nov. 1 having come and gone, is he violating any law by continued operation? Why doesn't he get definite information direct from Washington on how to proceed? What is the significance of the pledge he has been asked to sign? Does he have to sign a pledge if he is already on the Preference List? What is his status when on the Preference List? What about pooling?

These and many other like questions are constantly being asked, and to be able to give some answer to them the editor has recently made a two-weeks' trip through the East in order to interview those best posted and if possible get some definite information for the guidance of operators. The following frank statements are made on his responsibility and, of course, are therefore unofficial, but nevertheless may prove helpful in meeting some of the problems of operators.

Industry Has Been Ignored

First it should be thoroughly understood that the sand, gravel and crushed stone industries have been practically ignored. Numerous instances might be quoted to prove this, but they are hardly necessary. The reasons for this are many, but very likely the most potent one is the fact that the production of mineral aggregates is too new an industry to have made much of an impression upon other business men. Another obvious reason is that the building materials section of the War Industries Board is an over-worked bureau and that sand, gravel and crushed stone are, in its opinion at least, the most insignificant materials in that or any department.

Those who have followed the actions of the War Industries Board in regard to the restriction of building construction are aware that there has been a very obvious "passing the buck," from highest to lowest, and vice-versa, of any real assumption of responsibility. This is excusable and with full appreciation of the many difficulties involved in the situation no fair-minded operator will find fault. What the universal objection seems to be is the arbitrary and tactless manner in which the building materials section has chosen to treat members of an industry, who gladly and most willingly have extended to the Government the fullest possible co-operation.

Operation After Nov. 1

What will happen to you if you continue to operate and you have not signed a pledge or received your rating on the Preference List? Probably nothing will happen. The Government, as represented by the building materials section of the War Industries Board, has chosen to consider you and your business too insignificant for ordinary courtesy, or even attention; therefore so long as you individually are not proved to be depriving other more essential industries of labor, fuel or other necessities you should continue your business if you have any.

It is taken for granted that you are engaged in furnishing material for essential building work and can prove so if the occasion requires, since that is all the construction which is now progressing. Your case is somewhat different from that of other building material producers in that very little mineral aggregate is now being sold through dealers for purposes which you do not know. If you are furnishing material to dealers, the pledge to be filed with the War Industries Board is important. But if you are furnishing material for essential construction the pledge is not necessary for the reason that you are an adjunct to that job, and whatever authority is in charge of that work will see to it that you are supplied with the necessities of operation.

In the words of E. Guy Sutton, Secretary of the Committee on Mineral Aggregates in Washington, "don't borrow trouble. Wait till you have some before taking it to Washington." A large number of mineral aggregate producers are already on the Preference List and have been for a long time. They would not be getting supplies and fuel now if they were not. They will not have to file pledges and it will only complicate matters if they do so.

If you get a contract for highway material, the work must be O. K.'d at Washington before it can proceed. If it is O. K.'d at Washington, the authorities in charge of the project will see that you encounter no unnecessary obstacles to obtaining the labor and supplies for operation. It is in their interest to do so. It is time enough then to file your application for a place in the Preference List.

If you haven't a contract for essential work, don't try to get on the Preference List, but also don't shut down and lose your organization before you are compelled to do so. The Government, the real Government, of which you yourself are a part, doesn't want to destroy your business unless there is no other way out of it, and most certainly not by any general proclamation. In other words, sit tight and be a good patriot, and when trouble comes a way may be provided out of it.

Status of Plants on Essential List

You are on the Preference List because you are furnishing material for essential construction. You automatically cease to be on the Preference List when that contract is completed and your material disposed of otherwise. Theoretically you are in Class IV of the Essentials List, which entitles you to 20 per cent of your necessities of operation after plants in Class I, II and III are taken care of. Actually, however, your plant is in whatever classification the construction work itself is in. You may be sure the authorities in charge of that work are not going to hold it up because you can't get necessities or haven't signed a pledge or for any other cause within their power to overcome.

Many operators seem to think that to get on the Preference List will solve all their problems and give them a great advantage over their competitors. It will not. In the first place you can't get on the Preference List except as a contractor for essential construction and the mere fact of having gotten a place there probably would mean little without the pressure brought to bear by the authorities to whom you furnish material.

Keep Secretary Posted

Remember you have a secretary in Washington whose business is to look after your interests. You should file your pledge, if you make one, through him. At least you should at once notify him if you have filed your pledge and application for a place on the Preference List. He will then be able to follow it through for you.

The Secretary of the Committee on Mineral Aggregates is necessarily a very busy man. Anyone who knows Washington in these war times knows the difficulties of getting office room and clerical help. In the space of a few weeks the Secretary has collected production statistics from about 2,000 operators giving tonnage reports of approximately 70,000,000 tons. The mak-

ing of assessments on this tonnage of one-half mill per ton and the getting out of all these statements is no simple task. Consequently operators will save their secretary much useless labor by refraining from writing letters asking for general information to fit their specific cases.

No such general information is to be had from Washington officials, who have carefully avoided committing any of their remarks to paper, and whose opinions and decisions change considerably from day to day. You must use your own judgment as to applying what general information exists to your own case. Then when you have specific troubles in regard to getting fuel, labor or equipment, take up these specific troubles with the secretary and he will find you the way out, if a way out is possible. If you haven't any troubles, thank the Almighty, sit tight, do your best—and wait for trouble to come.

Pooling

It is practically certain that no official in Washington is going to officially authorize pooling, except in the industries where the Price Fixing Commission has set the price—and they will not do this except where different departments of the Government are competing for material—as the case is in some parts of the East. In other parts of the country, where a surplus of supply exists, the authorities are buying at the market prices or at the best bargain they can make.

If producers in any section of the country can agree with the authorities there on a fair price, and then allocate orders or pool production facilities, they can apparently rest assured that they will not be troubled by present Government officials. But evidently the producers themselves must shoulder the responsibility as well as take the initiative in such action.

Railway Ballast

The Railway Administration has entire jurisdiction over the purchase of railway ballast. If ballasting is allowed at all, it is essential work and you will have no trouble in getting on the Preference List. With the O. K. of the proper railway officials the building material section of the War Industries Board has no authority to hold up your case.

Agricultural Lime and Limestone Gain in New Priority Ruling

WASHINGTON, D. C.—In order to remove the impression held by some that Circular No. 9 of the Priorities Division of the War Industries Board had intended to make a distinction between agricultural lime and agricultural limestone and for other reasons, the Priorities Division has issued the following supplement to the circular. It will be noted that hereafter the farmer will not be required to obtain a certificate for the use of more than one ton in any one year:

Circular No. 9, issued by the Priorities Division, August 1, 1918, has been construed in some quarters as making distinctions between burned lime and ground limestone for agricultural purposes, and, further, in its application to the distribution of lime for agricultural purposes, as unnecessarily restricting same. Such circular is accordingly interpreted and modified as follows:

(1) The state official having supervision of agricultural production or soil conservation (usually the State Director of Extension) of the state where lands are situated may supervise without directions or permit from this division, the distribution and use of burned lime and ground limestone for agricultural purposes, and any manufacturer, producer or dealer in burned lime or ground limestone may supply such products for agricultural purposes under such rules and regulations as may be prescribed by such state official.

(2) This modification of Circular No. 9 shall not be construed or interpreted as modifying in any wise the distribution of lime for use otherwise than for agricultural purposes.

Fred C. Croxton, Federal Food Administrator for Ohio, in a bulletin states:

"This ruling (Circular No. 9) unfortunately has been construed in some quarters to exclude its application to ground limestone used for agricultural purposes, thus largely defeating the object of the (Agricultural Advisory) Committee and of the Secretary of Agriculture."

This amendment to the circular therefore leaves entirely to the directors of State Experiment Station and directors of agricultural extension work the matter of the sale of agricultural lime and limestone.

It is reported the War Service Committee on Lime will communicate with the directors of the State Experiment Stations with a view of having the manufacturers of the products concerned informed at the earliest possible date of the rules and regulations which will be prescribed by them.

Following are the directors in the states mentioned:

Indiana—G. I. Cristie, Purdue University, Lafayette, Ind.

Michigan—R. J. Baldwin, Michigan Agricultural College, East Lansing, Mich.

New York—A. R. Mann, New York State College of Agriculture, Ithaca, N. Y.

Ohio—Clarke S. Wheeler, Ohio State University, Columbus, O.

Pennsylvania—M. S. McDowell, Pennsylvania State College, State College, Pa.

New England Gravel and Stone Men Have Get-together

FOR THE FIRST TIME in history the producers of mineral aggregates (sand, gravel and crushed stone) of the New England states met together in one room, sat around a luncheon table and discovered that the other fellow did not have horns and was as willing as the next one to get away from the old-time cut-throat methods of business.

The occasion was the meeting called at the Hotel Taft, New Haven, Conn., Oct. 17, by B. D. Pierce, Jr., chairman of District No. 1 of the War Service Committee on Mineral Aggregates. About 15 producers were present and the meeting was a very satisfactory one, although no momentous business was transacted. It was just a friendly get-together with frank discussions of operating costs and difficulties, at which the universal conclusion seemed to be that "co-operation is better than cut-throat competition." The way was paved for more meetings and it is believed that great good will result to the industry in New England from these meetings.

Chairman Pierce (president of the Connecticut Quarries Co., New Haven), has shared his duties and responsibilities as committeeman on Mineral Aggregates with the following producers:

W. Scott Eames, general manager of the New Haven Trap Rock Co., New Haven, representative for the states of Connecticut and Rhode Island.

Le Roy Lane, general manager Boston Sand & Gravel Co., Boston, representative for the Metropolitan (Boston) district.

Frederick Ellis, general manager Essex Crushed Stone Co., Melrose, Mass., representative for eastern Massachusetts.

C. P. Dalton, general manager Maine Crushed Rock & Gravel Co., Portland, representative for the state of Maine.

A. S. Lane, general manager of the Lane Construction Co., Meriden, Conn., representative for western Massachusetts.

Concrete Boats Are Proven Successes in Operation

GENERAL INTEREST has been aroused by the success of the new concrete ocean-going steamer "Faith," plying between British Columbia and California ports. The scow "Pioneer," constructed in 1910 for use on the Welland canal was the first concrete boat built in North America. It was 80 x 24 ft. with 7 ft. draft. It is used to carry stone and at times whole carloads have been dropped on the deck from a 12-ft. trestle.

War Emergency and Reconstruction Conference Is Planned

All War Service Committees Are Invited to Atlantic City December 4, 5 and 6 to Act on Problems of Present and Future of Industry

WASHINGTON, D. C.—Plans for assembling at Atlantic City December 4, 5 and 6 all members of the country's more than 300 industrial war service committees for a great war emergency and reconstruction conference were announced October 28 by the War Service Executive Committee of the Chamber of Commerce of the United States.

The meeting will bring together from 2,000 to 3,000 industrial leaders to discuss problems that have arisen with the war. National councillors of the chamber, representing the more than 1100 commercial and industrial organizations which comprise its memberships, will meet at the same time and place.

Practical Methods Wanted

The main purposes of the conferences will be the determination of practical methods whereby industry may co-operate still more closely with the government through a more centralized scheme of organization. This probably can be accomplished best by the creation of a federation of all the war service committees. Questions of reconstruction, too, will be taken up.

For nearly a year the chamber has been engaged in directing the organization of war service committees in all lines of industry to assist the government in mobilizing most effectively the country's industries for prosecution of the war. It is evident that however far away the end of the war may be it is necessary to begin to outline a general program of organizing business for the period of reconstruction.

Need of Unified Action

Single industries, acting individually, can scarcely hope to prepare for reconstruction on the scale that will be necessary and a federation of all the war service committees of all the industries will be of inestimable value in co-operating with those agencies of the government to be created to deal with this subject.

The war service committees represent the most important and best informed body of business men ever associated for a practical and patriotic purpose and the conference therefore will be one of the most important business gatherings ever held in this country.

Common Interests

Certain common interests and duties that bind together all the war service committees include:

War industries: To keep efficiency and production at the highest possible point through stable labor conditions and steady flow of materials through plants, thus assuring the utmost aid in carrying out the war program of the government.

Non-war industries: To keep plant organization and production from falling below the danger line in the face of shortage of materials, labor and transportation.

Jointly: To face squarely and constructively the reconstruction period and to be ready through accurate and exhaustive study to lay before such governmental agencies as may be created to deal with reconstruction the necessary data bearing on the subject.

Program in General

Questions foremost at this time in the minds of every business man will be discussed at the conference by the best authorities that can be assembled. Speakers who already have accepted invitations to appear include Secretary of Commerce William C. Redfield, A. C. Bedford, James A. Farrell and Paul Warburg.

The conferences will include general sessions at which questions common to all industries will be taken up, sessions of committees within particular industries at which specific industrial problems will be discussed, meetings of related war service committee groups, and conferences of individual war service committees. National councillors of the Chamber of Commerce also will hold separate sessions.

The main conferences will be held on the Million Dollar Pier.

Important Announcement

EVERY citizen of the United States is vitally concerned in protecting the investment already made in our highways and is likewise concerned in seeing them developed along definite aggressive lines.

To help promote public welfare, you should therefore attend the Joint Congress of the Association of State Highway Officials and the Highway Industries Association, December 4 and 5, 1918, at the Congress Hotel, Chicago. Your presence on this occasion will greatly assist in helping to solve the problems our country will face in highway development and control after the war.

If you believe that now is the time to prepare for peace, you should attend this congress to assist in such preparation. Matters, both of national and state importance will be discussed by speakers of national reputation.

Registration of delegates, Tuesday afternoon, December 3, 1918.

W. D. UHLER,
President, American Association of State Highway Officials.

S. M. WILLIAMS,
President, Highway Industries Association.

Washington, D. C., Oct. 23, 1918.

Apply This to Crushed Stone and Gravel Industries!

A FETICH of the fertilizer industry (the editor suggests stone and gravel industries too), is tonnage. We manufacture to the limit of our capacity with the idea of reducing our overhead expense on the ton basis. Undoubtedly we accomplish our purpose, but at the same time we gain a surplus of stock in the carrying of which we lose more in expense than we saved in manufacturing cost. If the surplus stock is sold by main force, we lose still more in the selling price, and so, in either event. as a result of this surplus, the profits of the business are cut into deeply, or entirely absorbed.

In my judgment, the capacity of a plant is no proper unit to figure from as a basis for the accumulation of stocks but rather the actual deliveries of the previous season with an adidtion thereto or subtraction therefrom based upon a conservative judgment as to whether or not the then present conditions warrant us in expecting an increased or decreased volume of business as compared to the previous season's business.

In the light of our experience in the past, it seems to me it is not unreasonable to believe that each manufacturer would calmly and deliberately decide in his own mind and absolutely for and by himself, that hereafter he will manufacture sufficient to meet the full requirements of his trade, but that he will make no surplus for the mere privilege of either carrying it over or selling it at a loss. This is nothing more than common every-day horse sense.—B. A. Osborne, on "Post-War Problems of the Fertilizer Industry."

Depletion Allowance for Stone Quarries Sand and Gravel Pits

Prominent Operators Discuss This Important Item in Cost-Keeping

THE METHOD used by the Lake Superior iron miners to arrive at a depletion charge per ton of ore produced, as described in ROCK PRODUCTS of October 23, is evidently not considered applicable to the depletion of quarries and gravel pits. A study of expert opinions by operators who have given the subject of cost-keeping much study is interesting in showing a reluctance on the part of the owners and operators themselves to placing any considerable value on a stone or gravel deposit.

Rightly or wrongly (as time will tell) they seem to accept—unconsciously—the popular conception of the material they produce—that it is so much earth which has little or no mineral value. They see no parallel to the case of Lake Superior iron ore, which only a few years ago was also looked upon as so much dirt.

Where Public Opinion Hurts

It may be as some operators contend, that the courts will not recognize an intrinsic value in a deposit of trap rock—that it has no parallel with mineral deposits of higher value. But after all cases involving a valuation of highly developed quarry and pit properties are rare, and it is not strange that rulings and opinions merely reflect the common opinion that rock and gravel are dirt and of no particular value.

May not this lack of respect for the material we are dealing with be the prime cause of the undefined status of the crushed-stone and gravel business? Every operator knows that his business has little or no standing as an industry among bankers or other business men. The obvious reason is that other business men and the general public have not outgrown their original conception of a gravel pit as a side-of-the-road proposition with a couple of laborers shoveling material against an inclined screen, or a three-man quarry with hand drills and nut-cracker for a crusher.

Much educational work is required to change this popular conception and the ones who must do the educational work are the operators themselves. And why shouldn't they begin with a more respectful conception of the industry themselves? If a deposit of 500 acres is worth a million dollars' development work and plant, the material itself must have some intrinsic value or the operation is a mere contractor's excavation job with all its gambling elements, which is the very kernel of the trouble with the crushed stone and gravel business.

JOHN RICE, president of the General Crushed Stone Co., Easton, Pa., writes:

"As a general proposition, the fact that quarrymen do not pay sufficient attention to the matter of depletion, depreciation and amortization is greatly to their own disadvantage and that of the trade generally, because prices in one neighborhood tend to influence prices in another neighborhood. However, probably the facts with respect to a selling price are not due so much to the lack of knowledge of cost, of which depreciation, etc., are parts, as to the belief that more cannot be gotten for the product.

"The tendency of the quarryman to yield to the pressure for a lower or reduced price is from the fact that after he has made his investment his market is so limited that he dreads to see an order slip from his hands in which there may be a margin over and above the actual production cost. Consequently he takes it at any price, which leaves him better off to have the order than to lose it, forgetting the fact that by so doing he is establishing a lower basis of price, until finally he is filled up with orders which do not carry his overhead.

One Method of Figuring

"It is the old, old story, applicable to every line of business, where capital is limited, investment made, and where the operator feels he must keep body and soul together somehow, hoping for better things in the future. In the stone business the question of depreciation, depletion, and amortization are less definitely differentiated than in many other businesses, and in our own consideration of this problem we treat them practically as a whole. Our method of arriving at the proper figure to cover these items is as follows:

"We use our best judgment as to the probable life of the operation. Suppose, for instance, we consider it fifteen years, and this, perhaps, is a fair average of the life of a quarry. We know the original cost of the property, whether we own the land or whether the quarry is operated on lease or royalty. We endeavor to estimate the value of the property at the end of fifteen years as follows:

"Take the original cost as one item, because the conditions may be quite as favorable at the end of fifteen years as they were to begin with, particularly if there is substantially an inexhaustible supply of stone. Second, consider what the property might sell for as a going concern. Third, estimate the value of the personal property with a view of moving it to some other location, together with an estimate of the value of the real estate, if it is owned. Fourth, estimate the value of the property as second-hand machinery and scrap and real estate if it is owned.

Average the Values

"We take these four values and average them, which naturally is a value very much less than the original cost. We then take the difference between the original value and the average value obtained. We estimate the amount of tonnage we will produce in the fifteen years. By dividing the difference in value by the tonnage gives us an amount per ton which represents that portion of the original capital which has in reality gone into operating, and we charge this unit off monthly against every ton of stone produced, setting up a so-called depreciation account on the opposite side of the ledger which indicates a lessened value of the original investment by that much money, although we do not actually write down the value of the plant.

"The matter of interest on the investment is, in my judgment, also quite proper to take into account, but it is usually not allowed in theory, on the ground that interest is part of profit, and profits should be made sufficiently high to include something over and above the interest on investment. The same general purposes can be accomplished, of course, by taking the same assumptions and then taking a percentage of value of the plant so that it will be wiped out in whole or in such part as may be deemed necessary during a given period of time, which is only another way of saying the same thing.

Circumstances and Value

"With regard to the point made in the case of iron miners that if there has been a profit of 10c a ton and there is a million tons left in the quarry that there is $100,000 worth of existent value, I believe will be found wrong in principle and wrong in law. Such a value is purely speculative. It might be a value to one operator and not to another and, if this be true, it is not due to the intrinsic value but to the special knowledge or ability of the operator, and this should naturally not redound to the credit of the deposit itself.

"Naturally, a good deposit may have a value, especially after some development and proof of quantity and quality, other

than it would have as real estate for farming or other purposes, but, nevertheless, its only real value under such circumstances is something more than this but limited by the opportunity to develop a similar operation in some other neighborhood. Peculiar circumstances always give special values, but, taken as a broad proposition, stone itself has little intrinsic value other than what you can buy it for, as real estate available for quarrying purposes.

"For instance, in condemnation of mining properties or any real estate available for specific purposes you cannot introduce expert testimony to prove what somebody might make out of the property, you can only introduce such expert testimony to prove what such property is worth as property for the specific use in question. The expert may go through the mental process of considering its value if worked, but primarily his judgment must be assumed to be based on his knowledge of the value of other similar properties, and therefore pass intelligent judgment upon the value of the one under consideration.

What the Court Ruled Out

"I was retained as an expert by the State of New Jersey in the condemnation proceedings by the Palisades Park Commission in connection with property along the Hudson River. Some properties were maintained to be valuable as quarry sites. The owner had many experts to show that there was a certain tonnage in the given acreage, that it could be produced for a certain amount per ton, and that it could be sold for a certain amount per ton, and that the difference represented multiplied by the tonnage in place represented the value of the property. All such testimony was excluded and the most that any expert was allowed to testify to was that he had knowledge of other quarries along the Hudson River and of other property along the Hudson River which had been sold at so much per acre for quarrying purposes, and this was all that could be allowed.

"The argument to prevent the introduction of the testimony I referred to was supforted by such a theory as this:

"A certain piece of real estate at a particular prominent corner in a town could be made to earn a certain annual revenue if a hotel were built on it. Such testimony would be improper; the only testimony that could be introduced would be to have experts in real estate say that that specific property was worth so much as real estate, having in mind possibilities to which it might be used, but you cannot capitalize for the benefit of the owner that special knowledge which in itself may be the valuable thing and credit it to the value of the real estate.

Proportion Equipment Cost

"In a large sense, the tools, machinery, or investment of any kind necessary to produce a certain article are in the long run a direct part of the operating expense. The only question is to proportion it annually in case the length of time of the operation warrants or necessitates such a consideration in order to determine a proper cost.

"A contractor may buy an entirely new plant to do a certain piece of work within a year's time. If the character of the plant is all special and has nothing but a scrap value at the end of a year it is all chargeable directly against the job. If it takes five years, one-fifth of the original cost is chargeable annually, not forgetting the interest on the original investment, so far as a matter of cost is concerned. If the time is indeterminate for completing the job it must be assumed. If there is any probable credit to come out of the plant at the ultimate completion of the work this must be taken into account in the annual chargeoff. This is all there is to the whole problem in its last analysis."

V. O. JOHNSTON, president of the Lincoln Sand & Gravel Co., Lincoln, Ill., writes:

"So many conditions enter into the correct figuring of a proper depletion charge that no general rule seems applicable to all plants except the one defining depletion—an actual loss by removal for sale of capitalized assets. Until I read the article on the Lake Superior iron mines I had been holding the opinion that material removed under royalty was not properly subject to a depletion charge, for the reason that, in theory at least, the royalty represented the value of the material in place and its removal did not diminish the assets of the operator, but merely that of the owner in fee. I can see, however, how easily a royalty might represent only a portion of the actual value—in other words that a royalty contract might become, by reason of improved demand for material or unusually good prices, of such a value as to be properly capitalizable—in which event, as the article shows, the operator would be entitled to a depletion allowance in figuring net income.

Conditions May Make Allowance Unfair

"On the other hand, conditions might prevail that would make any sizeable depletion allowance unfair. For instance, my Lincoln deposit totals about 300 acres and runs an average of 50 feet deep—a supply sufficient to last more years than I expect to be interested in sand and gravel. As a matter of fact an annual sale from this deposit of 5000 cars leaves the balance worth as much or more than the total was. In other words the more the trade is established, the better the demand for material, the more valuable the balance becomes and a depletion charge that represented loss of capitalized assets would be hard to determine. I realize that this is an unusual case and that the principles laid down in the article are more generally applicable and the publication of them should be of benefit to those operators who fool themselves by not figuring any depletion as well as to those who cannot assess their real loss of assets by removal."

F. W. SCHMIDT, Morristown, N. J., writes:

"I do not think that royalty is a depletion charge. Where we operate on royalty, it is up to the owner to make his depletion charge. In these cases, we only charge depreciation on our plant and make no allowance for removal of material, whereas on properties we own, we make both a depletion and depreciation charge.

"I would hardly recommend that all quarry people place such a valuation on property from which to charge depletion as you suggested in the latter part of the article. Twenty-five years of experience have shown me that values of quarry property fluctuate so much due to market conditions that sometimes we would be rich, then again very poor. Our method is to charge for depletion from 2c to 5c per ton, depending largely on the actual acreage value of the property consumed and charging to depreciation sufficient to take care of plant account."

Members of War Service Committee on Lime

THE WAR SERVICE COMMITTEE ON LIME as now constituted is composed of the following district directors and officers:

WM. E. CARSON, Chairman,
Riverton Lime Co., Riverton, Va.

CHARLES C. BYE, Vice-Chairman,
Charles Warner Co., Wilmington, Del.

HENRY M. CAMP, Secretary,
Riggs Building, Washington, D. C.

GEO. B. WOOD, Director District No. 1,
Rockland & Rockport Lime Co., Rockland, Me.

H. J. RUSSELL, Director District No. 2,
F. W. Wait Lime Co., Glens Falls, N. Y.

C. C. BYE, Director District No. 3,
Charles Warner Company, Wilmington, Del.

J. KING McLANAHAN, JR., Director District No. 4,
American Lime & Stone Co., Tyrone, Pa.

WM. E. CARSON, Director District No. 5,
Riverton Lime Co., Riverton, Va.

HENRY ANGEL, Director District No. 6,
Kelley Island Lime & Trans. Co., Cleveland, Ohio.

G. J. NICHOLSON, Director District No. 7,
White Marble Lime Co., Manistique, Mich.

COL. C. W. S. COBB, Director District No. 8,
Glencoe Lime & Cement Co., St. Louis, Mo.

J. M. LOUNSBURY, Director District No. 9,
Allwood Lime Co., Manitowoc, Wis.

M. P. KENNEY, Director District No. 10,
Gager Lime & Mfg. Co., Chattanooga, Tenn.

C. N. WILEY, Director District No. 11,
Standard Portland Cement Co., Leeds, Ala.

J. F. POLLOCK, Director District No. 12,
Ash Grove Lime & Portland Cement Co., Kansas City, Mo.

H. DITTLINGER, Director District No. 13,
Dittlinger Lime Co., New Braunfels, Tex.

T. J. FLEMING, Director District No. 14,
California Portland Cement Co., Los Angeles, Cal.

Direct Routing of Freight Is Planned Under New Order

DIRECTOR General of Railroads McAdoo authorizes the following:

The Division of Traffic has issued the following instructions to the freight traffic committees:

"As an aid in the efforts of the Railroad Administration to secure the maximum in transportation efficiency of the carriers under Federal control, it would seem necessary to, at the very earliest possible date, establish what might be termed 'universal' transit, i. e., outbound shipments from a transit point to be allowed to move via any road regardless of the one hauling the inbound or raw product to the transit point, providing that such arrangements be confined to direct routes, and that nothing under such extension shall create circuitous or unduly out-of-route transportation.

Correction of Tariffs

"Tariffs restricting the application of outbound shipments to the roads hauling the inbound, or tariffs in any wise in conflict with the foregoing, shall be corrected, and where necessary to establish joint rates in order to apply the 'universal' transit system, such joint rates are to be established as soon as possible.

"Existing transit arrangements involving circuitous routes and back hauls shall be abrogated, or a proper charge therefor made, before doing which, however, associations or individuals enjoying such privileges are to be consulted, so that the abrogation, or the making of a charge, may be brought about with the least possible interruption to current business and the matter worked out harmoniously.

"It should be understood that where there is a transit charge in effect to-day it is not to be disturbed at this time, the question of applying a charge for transit service generally throughout the country, or the elimination of the existing transit charges, being a matter for future consideration."

System Under Private Control

Under private operation of the railroads the granting of transit privileges was based on commercial necessities existing at certain points, but carried a restriction which forced the outbound product to move via the same railroad that handled the raw product into the transit point. Under conditions that exist to-day, where there is unified control and operation resulting in a single system of railroads for all practical purposes, the restrictions that operated under private control could not be continued without a material loss in transporation, such as switching at transit points, loss in car days, and the use of circuitous routes in order to force the outbound product to the railroad or system that handled the inbound product.

The suggestion is made that individuals, firms, and organizations which are now enjoying, or are interested in, the general transit question, keep in close touch and coöperate with the various district freight committees which the Director General has established throughout the country, to the end that new conditions brought about by the use of universal transit can be put into effective operation as early as possible and without friction.

Good News for the Long Suffering Shipper

EDITOR ROCK PRODUCTS: Who can doubt after reading the following bulletin that the railroads are rapidly emerging from political feudalism and despotism:

Washington, D. C., Oct. 18—Late Bulletin—The Railroad Administration has decided that wherever there is transit all restrictions limiting the forwarding of a product to particular rails shall be eliminated as soon as the tariffs can be framed. This is a recognition of the fact that there is only one railroad and that restrictions now are without reason.

One country, one railroad, one measure stick, equal opportunity for all shippers is evidently the motto of our great Director General of Railroads.

M. J. EDGEWORTH,
President, Lehigh Stone Co.
Kankakee, Ill., Oct. 23, 1918.

I. C. C. Asserts Right to Change Freight Rates

Declares Authority to Alter Railroad Charges Initiated by McAdoo

WASHINGTON, D. C.—The Interstate Commerce Commission has asserted its authority to alter railroad freight rates initiated by Director General McAdoo, even without affirmative showing that they are wrong, and announced that the assumption that such rates are presumed to be right and just is incorrect. The pronouncement was in a decision written by Commissioner McChord finding for the complainants in the case of the Willamette Valley Lumbermen's Association against the Southern Pacific and others.

The complainants operate logging and lumber mills in the Willamette Valley in Oregon, selling their products in Montana, Wyoming, the Dakotas, Nebraska, Minnesota, Wisconsin and Michigan and western Canada. Mills in the vicinity of Portland, Ore., and on the Pacific coast manufacturing the same kind and grades of lumber have access to the same markets at a through joint rate materially lower than the combination of rates quoted from Willamette Valley mills, which have to pay local rates to Portland and then the Pacific coast group rate.

It developed after the decision was handed down that railroad attorneys, who technically represented the railroad administration in hearings of the case, had maintained that the Interstate Commerce Commission had no power to interfere with rates initiated by the President through the railroad administration. It is understood that the commission's statement of its attitude in the decision was primarily to refute that view. This is not the view, however, of Director General McAdoo, it was officially stated. He has repeatedly expressed the belief that the I. C. C. should investigate complaints of injustices under the new rates and make readjustments to effect equalization of rates.

Cost Accounting System for Lime Is Ready

WASHINGTON, D. C.—The Lime Association Cost Accounting System is being explained at all district meetings of the War Service Committee, which explanations are supplemental to the printed instructions and a chart sent on request to any lime manufacturer desiring to install the system. The system may be applied in both large and small plants.

The War Industries Board has learned that the cooperage industry has on hand a considerable surplus of elm hoops in 5' and 5' 6" lengths, and is asking the lime manufacturers to use these on lime barrels in place of wire hoops for the purpose of conserving steel and iron. No order has been issued prohibiting the use of steel hoops, but it is said one is in contemplation.

Concrete Ship Co. Buys Site for Yard

ORANGE, TEXAS.—The Gulf States Shipbuilding Co. has purchased a site here for a large shipbuilding yard. It will construct concrete ships to be used between United States and Mexico ports. The company is now assembling material for the plant.

Potash Production from Alunite

Much Despised Pink Spar in Utah Mountains Responsible for Growing Industry—First American Plant of Its Kind

By O. J. Grimes

A PINKISH ROCK, often analyzed in the old gold-mining days for traces of the precious metal, is found in great quantities in the mountains near Marysvale, Utah. It was much despised by old-time prospectors because of its invariably disappointing analyses. In 1910 two men with a vision—named Gillan and Custer—discovered the real value of the material as a source of mineral wealth and as a result of their efforts the first plant in the country for producing potash from natural rock was erected. This is the plant of the Mineral Products Co. at Marysvale, Utah.

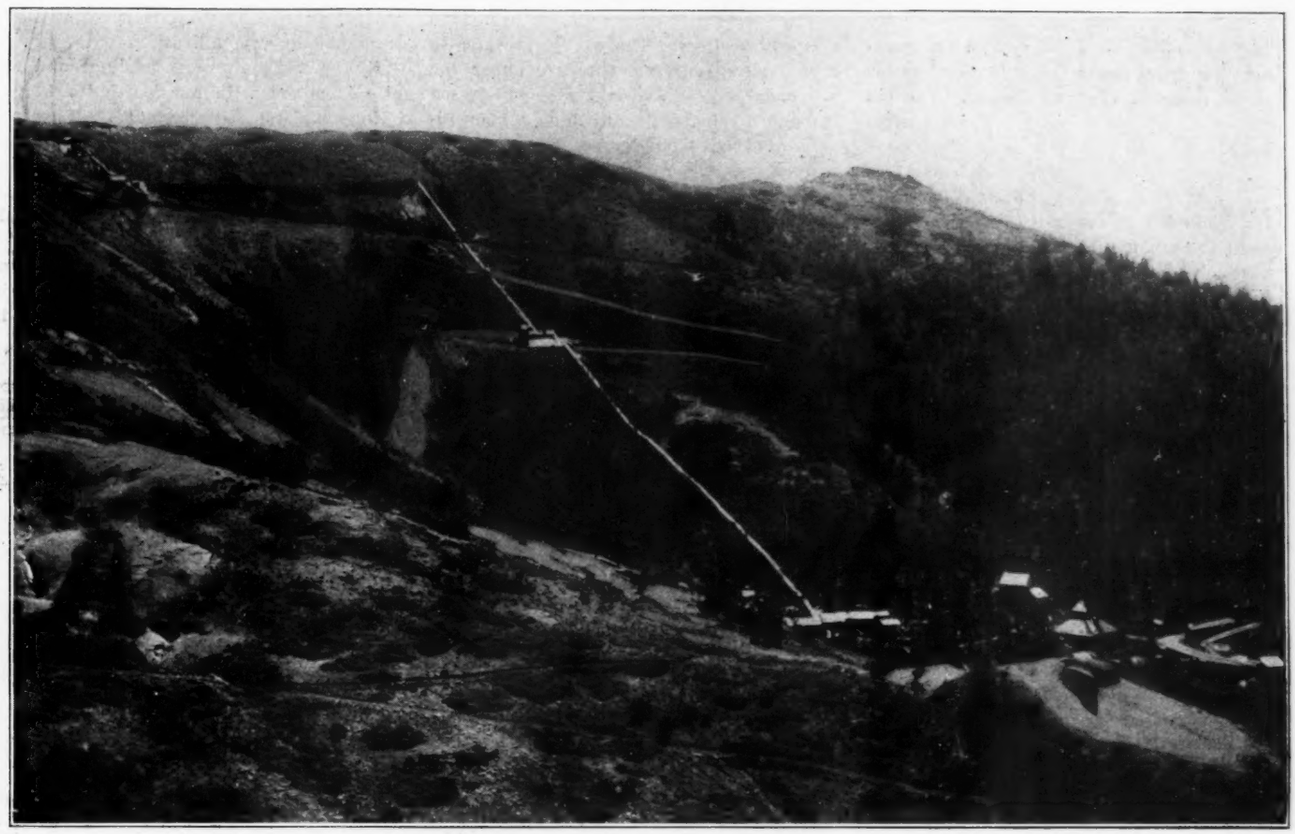
Since the first car of potash was shipped from the plant of the Mineral Products Co. in the fall of 1915, Marysvale has been more or less continuously in the public eye. Big things have been planned, and some enterprises have been undertaken, but as yet the indications are that the Marysvale potash industry is only in its infancy, the original company in the field remaining the only consistent producer. Other than that there are deposits of commercial size, comparatively little is known as to the extent of the alunite deposit of Utah. The Mineral Products Co., the pioneer in the alunite industry, is practically the only concern that has carried on development of a character which would suggest the possible extent of the deposit. The work there would indicate, in that instance at least, that the alunite goes to a depth of more than 300 ft., and continuous croppings in some of the other sections may be traced on the mountainside a distance of anywhere from 200 or 300 to 1,500 ft.

ALUNITE is a hydrous sulphate of aluminum and potassium (K_2O, $3AL_2O_3$, $4SO_3$, $6H_2O$), a crystalline mineral that is insoluble, or very slightly soluble in water. It occurs in coarsely crystalline form at Marysvale, where it was first mistaken for feldspar or calcite, and at Marysvale and elsewhere also in finer crystalline masses and in a soft powder resembling kaolinite.

Development of the deposits southwest of Marysvale, unusually high in potash content, brought about extensive investigations in other sections adjacent to the camp, with the result that there have been discovered new deposits that are believed to be of exceptional tonnage, but which carry less values in potash. The principal new dsposits of this character lie north and east of Marysvale, although some promising beds and ledges have been found to the east and southeast, and southwest.

While exploratory work on these deposits is somewhat limited, it is believed by many that the smaller potash content found near the surface is due to leaching, as the alumina content, which is insoluble, remains almost stationary throughout the Marysvale region. In the Cottonwood district the better ores carry potash values of around 10 per cent, and sometimes rich streaks run several points higher, and the alumina is practically stationary around 37 per cent. In the big ledges north and east of the town the average potash content of the ore found near the surface is from 4 to 6 per cent, and the alumina from about 30 to 35 per cent.

Typical formation of alunite deposit near Marysvale, Utah



Birdseye view of Florence camp and works of the Florence Mining & Milling Co.

The development of the alunite deposits of the Marysvale region, however, is due largely to the activities of Howard F. Chappell, an eminent New York chemist, who was among the first to realize the possibilities in connection with the treatment of the mineral. Some rather extensive investigations were conducted by one of the big smelting companies with a view to saving the alumina content, but the experiments did not develop a satisfactory process for commercial extraction of the metal and the investigations were halted.

Mr. Chappell and his associates worked out the process for the extraction of the potash and erected the first alunite mill in the country. The first shipment of some twenty tons of potash salts was sent out from Marysvale in September, 1915, and, according to authentic reports, averaged better than 95 per cent potash. A satisfactory method for the saving of the alumina had not been worked out, but the production of potash has been maintained by the Mineral Products Co., of which Mr. Chappell is the head, since the fall of 1915, except during the period of 1916 and 1917 when operations were temporarily suspended because of the destruction of the plant by fire.

When the new plant was completed, more than a year ago, several new features were included in its construction, which made the extraction of potash more economical and increased the capacity of the mill to an appreciable extent. While no accurate figures with reference to production are available, it is estimated that the company is now producing between twenty and thirty tons of potash a day, with a gross value of approximately $400 a ton.

All during the period of potash production the Mineral Products Co., as well as other interests, has conducted experiments to devise a method for recovering the alumina content of the ores in marketable form. The residue of the ore after the potash is extracted carries a high percentage of alumina, and this residue has been laid aside, pending the day when a satisfactory process is evolved. It is understood that recent experiments at the Mineral Products plant have been of a highly satisfactory character and that additions, including cottrels, are being made to the plant with a view to producing metallic aluminum.

Alunite Analyses Show High Value

Analyses of the alunite such as is found on the property of the Mineral Products Co., the Florence Mining & Milling Co., the Bradburn claims and others in the Cottonwood region indicate that it carries approximately 37 per cent alumina, around 10 per cent potash, about 38 per cent sulphuric acid and very little silica and iron. Figuring the potash content at $4.25 a unit and the alumina at $6.60, the total value of each ton of alunite of this character is $286.70, as against $42.50 per ton for the potash content alone as now treated.

Although the Mineral Products Co. has outdistanced all others in the region in the development of alunite deposits and the production of potash, the Florence Mining & Milling Co. probably has the most extensive holdings of all the concerns yet organized and ranks second in the matter of development. Much of the Florence property is on the same alunite belt as the Mineral Products and in some places their property lines adjoin. All told, it controls some eighty claims in the Ohio and Mt. Baldy mining districts.

Calcining Plant Erected

Shortly after the Mineral Products Co. had demonstrated the possibilities in connection with the extraction of potash from alunite the Florence interests erected a calcining mill at Marysvale. No leaching or lixiviation plan was established and only calcined material was produced. Because of the location of the mine it was found extremely difficult to operate except during the hot summer months and more than a year ago it was decided to erect another mill employing a different process at the mine. The construction was begun under the direction of F. A. Cullen, who was formerly associated with Dr. F. K. Cameron in extensive experiments in the production of alumina and potash from alunite, and who evolved what is generally known as the Cameron-Cullen processes.

The plant, which uses a reverberatory furnace instead of a rotary kiln for roasting, is nearing completion and a test run is to be made in the near future. The old mill at Marysvale is being used for custom work.

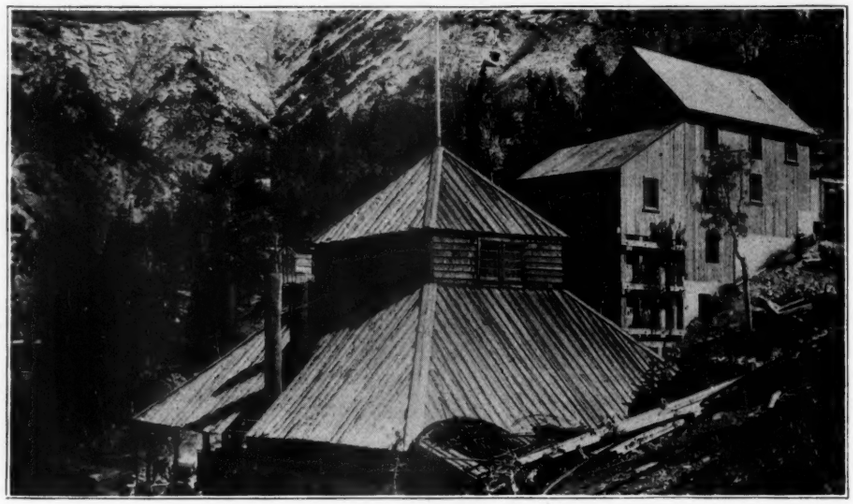
A crushing plant with a maximum capacity of 250 tons daily is practically ready for operation in connection with the new plant at the mine. Four reverberatory furnaces are being put in to roast the ore. From the furnaces the roasted ore passes into big cement tanks and from there the solution is pumped into digesting tanks. After passing through filter presses the solution is pumped into open pans above the furnaces for evaporation. Mr. Cullen is confident that the problem of producing alumina in a commercially profitable way has been worked out and that both alum and alumina, as well as potash, will be turned out at the new plant. It is expected that the plant will be completed and in operation by Sept. 1.

Potash Recovery Methods

Six or seven processes have been patented for recovering the soluble potash salts from alunite, three or possibly four of which have been practically tested. These are the Chappell, the Morgan, the Cameron and the MacDowell processes. Dr. Cameron expresses the view that under normal trade conditions potash can be profitably produced from alunite only by marketing the alumina in some form, so as to pay part of the cost of production.

The Mineral Products Co. is using the Chappell process. The ore is crushed so that its coarser fragments are about the size of large peas, and is then slowly passed through a rotary kiln, in which a temperature of about 750 degrees Centigrade is maintained. The roasted alunite is digested with boiling water for several hours, and then filtered through Kelly presses. The cake, which is mainly alumina, is stored for possible use later. The filtrate is placed in a modern multiple-effect evaporator, and potassium sulphate of about 95 per cent purity, practically free from chlorine, is recovered by crystallization.

By the Morgan process finely ground alunite is mixed with one-fourth its weight of lime and roasted at about 1,000 degrees Centigrade, preferably in a rotary furnace of the type commonly used in cement manufacture. The lime is used chiefly to prevent the escape of objectionable fumes of sulphur, as practically all the sulphur in the alunite combines with the lime to form gypsum or anhydrite. The roasted mixture is leached in a series of vats, where it is



Near view of mine and plant at Florence, Utah

Plant of the Mineral Products Co. for making potash from alunite, Marysvale, Utah

heated and agitated by steam so as to obtain hot saturated solutions, which on cooling yield crystallized potassium sulphate. The solid residue from the leaching appears to be mainly a mixture of gypsum and alumina for which several methods of utilization have been proposed.

By the Cameron process alunite is roasted at a moderate temperature—550 to 750 degrees Centigrade—and the roast is leached to obtain potassium in soluble form as alum instead of as the simple sulphate. The solution, which usually contains an excess of aluminum sulphate, is brought to saturation in a counter-current system of leaching vats, and is then filtered off hot. On cooling, the solution deposits crystals of potash alum mixed with more or less aluminum sulphate. The mixture is then roasted at a temperature a little above 750 degrees Centigrade and yields a solid residue of pure alumina and potassium sulphate, which is separated by a second leaching and crystallization. An advantage claimed for this process is that it produces a finished high-grade alumina simultaneously with the potassium sulphate.

The MacDowell process provides that ground alunite be roasted at a temperature sufficiently high to drive off the excess of sulphur as oxides. The temperature is then raised and the potassium salt and some of the sodium are volatilized, condensed, and passed through a collecting apparatus.

Alunite Domestic Potash Source

Although alunite has been mined for many years in foreign countries as a source of potash alum, the principal attention has been given to it in this country as a possible source of domestic potash. The extraction of potassium sulphate from it on a commercial scale has been accomplished. Possible by-products in the extraction of potassium sulphate are alumina and sulphuric acid. The successful production of alumina or its derived products on a commercial scale appears to be a possibility, but there is little prospect of the production of sulphuric acid at present.

The possible derivation of alumina as a by-product in the extraction of potash from alunite already has been mentioned. Experiments on the direct extraction of alumina from high-grade alunite have indicated that a process may be worked out and may be a commercial success if freight rates from Utah to eastern aluminum manufacturing plants are not prohibitive. As an offset to freight rates, however, the alumina produced from high-grade alunite is purer than that from the bauxite ores of the southern states. The low-grade mineral contains too much silica to be used as an ore of aluminum. The extraction of both potash and alumina from the same lot of ore should go further toward making a successful industry than the extraction of either product alone.

New Rock Products Industry Developing in West

Oil from Shale Rock—Quarrying and Crushing Proposition

WITH the demand for gasoline and for the crude oil from which it is made, as well as for the ammonia to be used in fertilizers, growing more and more imperative, it is encouraging to learn that rapid progress is being made in the work of producing these materials from the oil shales that are found in great deposits in our Western States, especially in Colorado, Nevada, Montana, Utah and Wyoming. More than a dozen large companies have been organized to win oil from these shales and are now making experiments to determine the most efficient and economical way of doing so. Aerial tramways are being built to bring the shale from mines to be opened high on the sides of the mountains down to retorts or distillation plants to be built in the valleys near water and near lines of transportation.

Chemists are finding that a great many useful things can be made from the oil shales—such as dyes, explosives, paints, fertilizers, and substitutes for rubber, as well as gasoline, kerosene, paraffin, and flotation oil—but the industry is not yet far enough advanced to enable anyone to tell which of these products or how many of them can be manufactured at a profit. The industry must eventually succeed, but its success may depend largely on the profits derived from the sale of the by-products.

A report recently published by the United State Geological Survey, Department of the Interior, shows the results of geologic examinations of oil shale in the Uinta Basin, Utah, by D. E. Winchester, and gives records of distillation and tests of samples of shale collected elsewhere in the United States. The oil shale in Utah is black or brownish black, except on weathered surfaces, where it is bluish white or white. It is fine grained, slightly calcareous, and generally free from grit. It is tough, and its thinner beds are remarkably flexible. Its flexibility distinguishes it from ordinary carbonaceous shale, which is brittle. When ignited with a match a thin splinter of oil shale burns with a sooty yellow flame and gives off an asphaltic odor.

Oil shale is heavier than coal, having an average specific gravity of about 1.6, but the richer shales are not so heavy as the leaner ones. The oil shale of the Green River formation contains about 60 per cent of ash. As good coal contains less than 10 per cent of ash, oil shale cannot be profitably used directly as fuel. In order to obtain its content of oil the shale must be mined or quarried, crushed, and distilled in huge retorts, in which it gives off crude shale oil, ammonia, and fuel gas, products from which may be made a large number of valuable substances. Though some of the shale has on distillation yielded more than 2 barrels of oil to the ton, very little of the oil is in the shale in the form of oil. The shale contains a great mass of partly bituminized vegetable matter, which can be converted into oil by heat.

A map that accompanies the geologist's report, which is published as Bulletin 691-B, indicates that there is a vast area of oil-shale land in northeastern Utah, and the report shows the thickness and richness of the shale beds at many places.

Recovery of Potash from Silicates and Alunite

THE INDUSTRIAL PRODUCTION of potash demands its recovery from the raw material in a soluble form and a high concentration.

Potash from Silicates—This problem has confronted the chemist for many years. It is not a question of actual recovery, but of cost, that determines the success or failure of the process. Many tests have been made and patents granted, and these may be classified under the three heads:

1. Wet methods. These involve a treatment of the raw material with some chemical reagent with or without added pressure, and a recovery of the salt from solution by evaporation and crystallization.

2. Sintering methods. Heat the raw material with one or more chemical reagents without volatilizing the potash. Treat the clinker with water alone or with the addition of some chemical reagent, and recover the potash from solution by evaporation and crystallization.

3. Volatilizing methods. These employ heating with reagents to a temperature sufficient to volatilize the potash recovered by solution and evaporation.

The first two general methods have not, up to the present time, been applied in commercial practice. The third is in use and gives much promise for the production of potash as a byproduct in the cement and iron industries.

Potash from Alunite—A general process for the recovery of potash from alunite is to crush the ore, mix it with powdered coal, and roast it in a rotary furnace. This treatment drives off part of the sulphur as an oxide, and forms potassium sulphate and aluminum oxide. Leaching with water dissolves the potassium sulphate and filtering separates it from the insoluble alumina. The salt in solution is recovered by evaporation and crystallization.

Temperature of Burning and Hydration of Magnesium Oxide

Important Experimental Data in Relation to the Manufacture of Artificial Magnesite

By E. Schmatolla

THE following remarks are abstracted from articles by Edward De Mill Campbell in the "Journal of Industrial and Engineering Chemistray":

"In a previous article (1909 page 665-68) results of burning magnesite between 500 and 1,450 deg. C. and treatment with water from one day to 18 months were stated.

"The magnesium oxide resulting from the burning of magnesite had the following composition: Silica, 2.53 per cent; alumina and ferric oxide, 2.70 per cent; calcium oxide, 3.96 per cent; magnesium oxide, 90.78 per cent.

"The burnt magnesite required 44.59 per cent of its weight of water to completely hydrate.

"The dissociation of the magnesium carbonate is completed at 600 deg. C. The hydration of magnesia burnt at 600 to 800 deg. C. is completed in three days.

"The complete dissociation of calcium carbonate takes place between 800 and 900 deg. C.

"A change in the constitution of the magnesium oxide takes place between 1,000 and 1,100 deg. C. decreasing the hydration.

"Burnt at 1,450 deg. C. (cement burning temperature) the magnesia after 18 months' immersion in water combined only with 61.4 per cent of the water required for complete hydration.

"While the samples burnt at 1,100 deg. C. were completely hydrated within three months, very slow hydration takes place in the case of samples burnt at 1,200 deg. C. and above.

"Samples burnt at 1,450 deg. C. showed the following percentage of hydration:

"After 1 year, 23.31 per cent; after 3 years, 27.97 per cent; after 6 years, 31.82 per cent."

Table

Percentage of Complete Hydration:

Temperature of burning	Time of hydration in years					
	1	2	3	4	5	6
1200°C.	91.8%	94%	100%			
1300°C.	64.0%	72%	76%	81%	82%	83%
1400°C.	62.0%	70%	75%	78%	79%	81%
1450°C.	51.0%	58%	66%	66%	66%	70%

The research work of Mr. Campbell is very important. It is only to be regretted that it does not cover temperatures higher than 1,450 deg. C., including the temperature of the steel furnaces (about 1,600 deg. C., or 2,900 deg. F.), in which dead burned magnesite or dolomite is used for lining.

With this respect practical experiments made by the writer (E. Schmatolla) in a regenerative gas furnace may be of interest. From a similar magnesite to that described by Mr. Campbell he has made magnesia brick without adding an extraneous binder and burnt these bricks in a regenerative kiln or furnace of his own design at a temperature of Seger cone 28 and even higher (about 1,700 deg. C. or 3,100 deg. F.)

These bricks were very dense and after having been heated to red heat could be thrown into water without showing any change. This allows of the conclusion that at a certain high temperature the magnesia is entirely dead burnt but this temperature is above that of the ordinary rotary cement kiln, however, it is apparently within the range of the regenerative gas or oil furnace.

Producers and U. S. Officers Discuss Potash Situation

Cheapest Sources Should Be Developed by U. S., Says Department of Agriculture

WASHINGTON, D. C.—At a conference on the American potash situation, held recently in the office of William Wallace Mein, Assistant to the Secretary of Agriculture, in charge of fertilizer control, it was stated that the view of the Department of Agriculture is that the Government should do all that is possible to encourage the production of potash from the cheapest sources in this country in order to enable farmers to obtain it at a low price, because foreign supplies are now unavailable.

Some of the domestic sources of potash that may be further developed are blast furnaces, from the fumes of which potash-bearing materials may be precipitated; cement mills, greensand, certain shales, the brine of some lakes, mostly in Nebraska, and the giant seaweed (kelp) of the Pacific Coast.

The domestic production of potash for the coming year is expected to be about 60,000 tons, much more than the previous year, but still only about one-fourth of the annual pre-war consumption, according to A. W. Stockett of the Bureau of Mines.

Representatives of the Bureau of Plant Industry of the Department of Agriculture pointed out that certain crops in the East are showing unmistakable signs of "potash hunger" and the general agreement at the meeting was that farmers should be informed of facts bearing on the value of potash for crop production and that all efforts should be made to supply the farmers.

The purpose of the meeting was to promote free discussion among the different interests involved in connection with the potash situation. R. C. Warriner, special assistant in fertilizer control, presided. Others who took part in the conference were: Charles H. McDowell, of the War Industries Board; Dr. Oswald Schreiner, W. A. Orton, and H. A. Edson, of the Bureau of Plant Industry; Dr. A. C. True, Bradford Knapp, and C. B. Smith, of the States Relations Service; F. H. Brown, A. R. Merz, and J. W. Turrentine, of the Bureau of Soils; A. W. Stockett, of the Bureau of Mines; W. D. Huntington, of the Davison Chemical Company, and Frederick Rayfield of Swift & Company, representing the Chemical Alliance; George A. Lee and T. E. Stevens, representing the Nebraska potash producers, and E. A. Goldenweiser, statistician in fertilizer control.

Spanish Potash Supply to Be Under National Control

THE SPANISH GOVERNMENT has assumed supervisory control of all mining concessions already granted or to be granted producing potash salts and other substances entering into the manufacture of fertilizers, according to the text of a law recently passed, says the Philadelphia Enquirer. Work in such mines will be under the mining inspector of each district.

The law referred to also authorizes an appropriation of $15,296 for the surveying and exploiting of the already discovered sources of potash in the Provinces of Barcelona and Lerida owned by the Government.

When the total national production of potash salts reaches 50,000 tons or more annually, a special office will be created to regulate such production, and the quantities and proportion to be produced by each mine will be determined by the office in question.

Safety Committees at Cement Plants in War Time and After*

Some Suggestions Applicable to Other Industries Also — Organizing the Work and Importance of Management — Creating and Maintaining Interest of Employes — Rotating Membership — Buttons and Bulletins

By Richard A. Dittmar
Power and Maintenance Superintendent at Atlas Portland Cement Co.'s Hannibal Plant

INDUSTRIAL ORGANIZATIONS are passing through an emergency period, and the need of active and efficient safety organizations is very strongly felt. Our man power is lacking both in quality and quantity for the reason that the men of the best possible caliber must be used in the nation's safety work—the war. What is left for industrial work must be conserved, trained and utilized to the best advantage —these men must be taught safety habits, to act and think safety, and for this reason our safety committees or really our safety schools—for I believe we are all agreed that education is the keystone in safety work, must be adequate and adapted to our particular industry.

The cement industry calls for a line of safety work which must eliminate peculiar hazards incidental to our industry, and we are daily confronted with new problems by reason of the present labor turn-over, scarcity of men and the therefor following necessity of introduction of woman labor into the industry.

The work of the safety committee in our cement plants is as varied as it is essential, when we consider the number of different hazardous operations such as are connected with quarrying and mining with the use of explosives; railroading; work in the mill proper, where we are confronted with a variety of ponderous machinery that cannot be adequately protected by guards, conditions in electrical and steam power plants, and in numerous other departments incidental to cement plant operation. The safety work in connection with these activities is made still more difficult for the reason that a number of them are necessarily on a 24-hour basis.

Safety and Welfare Work

Along with the foregoing we are confronted with welfare problems. I have always felt that safety work was welfare work and the reverse, the two activities being so closely related that it is hard to define a line between them. In organizing a safety committee for a cement plant we must therefore have an organization that can adequately handle existing problems along the lines of both safety and welfare work.

Modern tendencies along all lines of endeavor are towards standardization. I would hesitate to prescribe an outline for a standard safety organization suitable for all sizes and kinds of industrial organizations but I feel that a standard safety and welfare organization for cement plants is logical and practical and I hope that the suggestions which are given in this paper may be of help to those who contemplate organizing such committees at their plants. I feel that to be most effective a safety committee should be founded on the central idea that it should be educational and promulgate the idea of safety in thought and action throughout the organization.

Management Important

The effectiveness and efficiency of a safety committee depends largely on the way it is managed. For results therefore we must look toward the man in charge, the chairman; therefore, the careful and wise selection of this man is of first importance. He is the soul of the organization and therefore we must not select a man who advances his ideas in a lukewarm and half-hearted way. The chairman must show a deep interest in the work; must have a strong personality and be a man who can so project his convictions that they become so permanently absorbed by the committee members that his men will continue to be good workers after the expiration of their term. The chairman of the safety committee should report directly to the superintendent of the plant.

In the standard safety committee there should be as a nucleus or instruction staff a number of permanent members who are constantly in touch with all phases of safety work and operations at the plant. Chief among these members is the safety inspector who should report directly to the committee in all his duties. The Safety Inspector should also furnish prompt first-hand information to the Superintendent of the Plant in accident cases, and keep him informed of any unusual conditions that should receive prompt attention.

Should Make Written Reports

At each committee meeting the safety inspector should present a written report in three sections, each section to be taken up in the regular routine of the committee's business program as outlined later. He should have the freedom of the entire plant and make frequent trips throughout it in company with the rotating committee members and their alternates in the various departments, instructing these men in safety work by pointing out hazards and drawing their attention to unsafe practices. To be efficient in this work of instruction, the inspector should keep himself informed through safety publications of recent developments in the "Safety First" movement and in discussions at the committee meetings make brief mention of topics of interest appearing in current safety literature. He should prepare and maintain danger signs and bulletins and have charge of other advertising work in connection with safety work. He should follow up the approved recommendations, inspect new installations and new machinery and see that the necessary safeguards are provided. There are many other duties growing out of this office that will naturally develop.

The other permanent members to be considered are: The Fire Inspector or Fire Chief; the First Aid Attendant or Plant Physician and perhaps one or two foremen particularly adapted to or interested in safety work and whom the Superintendent may wish to train as leaders in the general movement. The foregoing members forming the permanent committee should be appointed by the superintendent.

Rotating Membership

To complete the committee, the "Rotating Membership" idea presents itself as most logical, the term of membership depending on the size of the organization, size of the committee and frequency of its meetings. A new committee should hold weekly meetings and membership should be for three months only; as the safety work advances the meetings could be held bi-weekly and the term of membership changed to six months. The main essential is to imbue an enthusiastic spirit in the men, to get as many of them thinking safety and boosting safety as soon as possible. I feel that large committees are desirable, for with the large committee the permanent members or instruction staff can make greater headway in their work; and in safety work we want to progress rapidly and thoroughly.

To determine the logical number of ro-

* Paper delivered at Seventh Annual Safety Congress of the National Safety Council, St. Louis, Mo., September 19, 1918.

tating members it is necessary to take into consideration the various plant departments such as Quarry, Mine, Railroad, Mill Operating, Mill Maintenance, Shops, Power, Packing & Shipping, and there may be other desirable sub-divisions. Each individual department should send a representative or have rotating members on the safety committee.

Organizing the Committee

In organizing a new committee the members are to be recommended to the superintendent by the foreman of the respective departments. The department then elects an alternate member to serve in the absence of its regular representative and when the term of the regular member expires, if the alternate's work has been good and if he has displayed a keen interest in safety work, the foreman should then recommend him as a permanent member. This will tend to create a better attitude in the alternate members and make better safety men and committee members of them.

All the appointments should be made by the superintendent and this should be done through a personal letter to the man when he becomes an alternate and again when he becomes a permanent member. In this letter the superintendent should briefly outline the member's duties and ask his support and heartiest co-operation in safety work. In this way interest is aroused immediately and the man will feel that his services are being appreciated and he will make a special effort. The superintendent should also write a personal letter to the retiring member, thanking him for his past services in safety work, appointing him an honorary member and at the same time requesting his continued interest and help along safety lines.

Duties of Representative

It is the duty of a representative of a department to attend the committee meeting and present safety and welfare recommendations for his department, acting as its representative; make frequent inspections of department with his alternate, safety inspector and fire inspector; watch for unsafe conditions and practices; investigate accidents and be prepared to report to the committee. Where the representatives have been chosen by their fellow workers, these men feel more free to offer their candid suggestions and recommendations to him and they will also take an interest in safety work which would be difficult to obtain otherwise.

It should be the effort of the chairman to make the committee meetings as attractive and interesting as possible. It is essential to have a definite program or order of business starting with roll call, and minutes of previous meetings; then take up the first section of the Safety Inspector's report, which should be a review of accidents since previous meetings, disclosing his investigations, fixing responsibility, together with his recommendation to prevent a possible recurrence. At this time remarks may be received from the special representative of the department held responsible or a report received from members whom the chairman might have found it advisable to detail at the time of the accident to make a special investigation.

Next under old business the safety inspector should present the second section of his report. Here he should announce to the committee recommendations of the previous meeting approved by the superintendent and also recommendations that have been completed with his approval and that are ready for the committee's inspection and acceptance. He should also bring before the committee old recommendations that should receive special attention and report on special investigations assigned to him by the chairman.

Presenting Recommendations

New Business should next be taken under consideration and at this time the third section of the Safety Inspector's report should be received. This section should present his recommendations for approval by the committee. At this time recommendations should also be received from the committee. These recommendations should relate to new safeguards; maintenance of existing safeguards; unsafe practices; insanitary conditions; lighting, etc.

Recommendations thus accepted by the committee and approved should be numbered consecutively, made out in duplicate on a special form, signed by the chairman and the original forwarded to the superintendent for his approval. Recommendations approved by the superintendent should be sent directly to the Safety Inspector, who should assign and follow up the work and see that it is properly carried out.

A general discussion should follow with remarks and criticisms from the various members. It should be the aim of the chairman to make this section of the meeting as instructive and as interesting as possible by presenting short talks on safety subjects or by having various members talk on prepared subjects. First aid demonstrations are very instructive and tend to create interest. Outsiders may also be invited to talk on safety subjects or the committee as a whole may make an inspection trip of various sections of the plant. Too much emphasis cannot be placed on inspection; either the committee as a whole should follow up a schedule of inspection or the chairman may detail certain members to make a special inspection of parts of the plant or hazards reported.

Use the Button

There is one more very important consideration in promoting successful safety work in an organization. We all feel that it pays to advertise, but what is the procedure to adopt? One of the best advertisements and one that also fills the double purpose of maintaining safety thoughts and stimulating interest and safety actions, especially in the ex-members, is to identify each committee man with a small gold button. The button adopted by the Hannibal Committee of the Atlas Portland Cement Co. presents a round green area enclosing a white cross, a gold band surrounds the green area upon which is embossed "Safety & Welfare—A. P. C. Co." The men are anxious to wear these buttons and naturally boost for safety in order to deserve appointment as committee members. A rubber stamp may also be adopted to be used on all committee correspondence and on posted notices and circulars.

Have Live Bulletin Board

It is also essential to have a live bulletin system. We have adopted a plan at our Hannibal plant which has received no small amount of favorable criticism and which has been a big factor in spreading before the men the safety slogans, instructions and bulletins received regularly from The National Safety Council, besides other notices and instructions we wish to publish. We adopted a circulating bulletin system, so that each slogan, picture, or bulletin makes a complete circuit of the plant occupying from day to day various stations which have been chosen in prominent places near time clocks and drinking fountains. The notice is placed in a frame and this frame is taken to the first station; on the following day it is moved to the next station in the circuit; until it has occupied all the stations. Each frame has a removable wooden back so that the notices are easily replaced, and is painted in green enamel, with a white cross at the top and a distinguishing number at the bottom.

Keep Bulletin Board Up to Date

A central bulletin board may be advisable, but it loses its effectiveness if allowed to become littered up. **A bulletin board must be kept alive.** In safety work too much attention cannot be directed towards developing a good and efficient advertising system.

It may also be advisable for the safety committee to get out a small booklet setting forth safety rules that apply to the particular plant. The committee men should see that these rules are not broken and should admonish the offenders.

In conclusion, the primary object of a safety organization is to educate the men and make them think safety. The class of men we deal with learns most readily by looking at pictures, seeing actual results and making comparisons therefrom. Safety pictures, examples and slogans must be everlastingly kept before them. These men observe and imitate the actions of their fellow workmen and the committee men should therefore mingle intimately with them and be constantly on their guard to set good safety examples.

New Pacific Coast Gravel Plant

Fresno Rock Products Co. Has Compact Gravity Plant with Two Crushers on Tower Structure

By M. E. Baudin

THE FRESNO ROCK PRODUCTS CO., Fresno, Calif., of which C. W. Wood is president and F. W. Woods, secretary and manager, has recently completed and now has in operation one of the most complete and up-to-date gravel plants on the Pacific Coast.

This plant is of the Hadsel slack-cable excavator type. The structure is built of 12 x 12-in. timbers and is 125 ft. high. The material is brought to the plant by means of a slack-cable excavator, which is attached to a reinforced anti-friction turntable on the extreme top of the plant. The excavator is comprised of a 2-cu. yd. bucket, a 150-hp. electric hoist and a 50-hp. electric hoist. The 150-hp. hoist is used for filling and traversing the bucket. The 50-hp. hoist is only used for raising and lowering the track cable on which the bucket travels. This track cable is anchored on the extreme outside of the deposit and passes up over a 48-in. sheave at the top of the plant and down to an anchorage on the other side through a set of equalizing blocks.

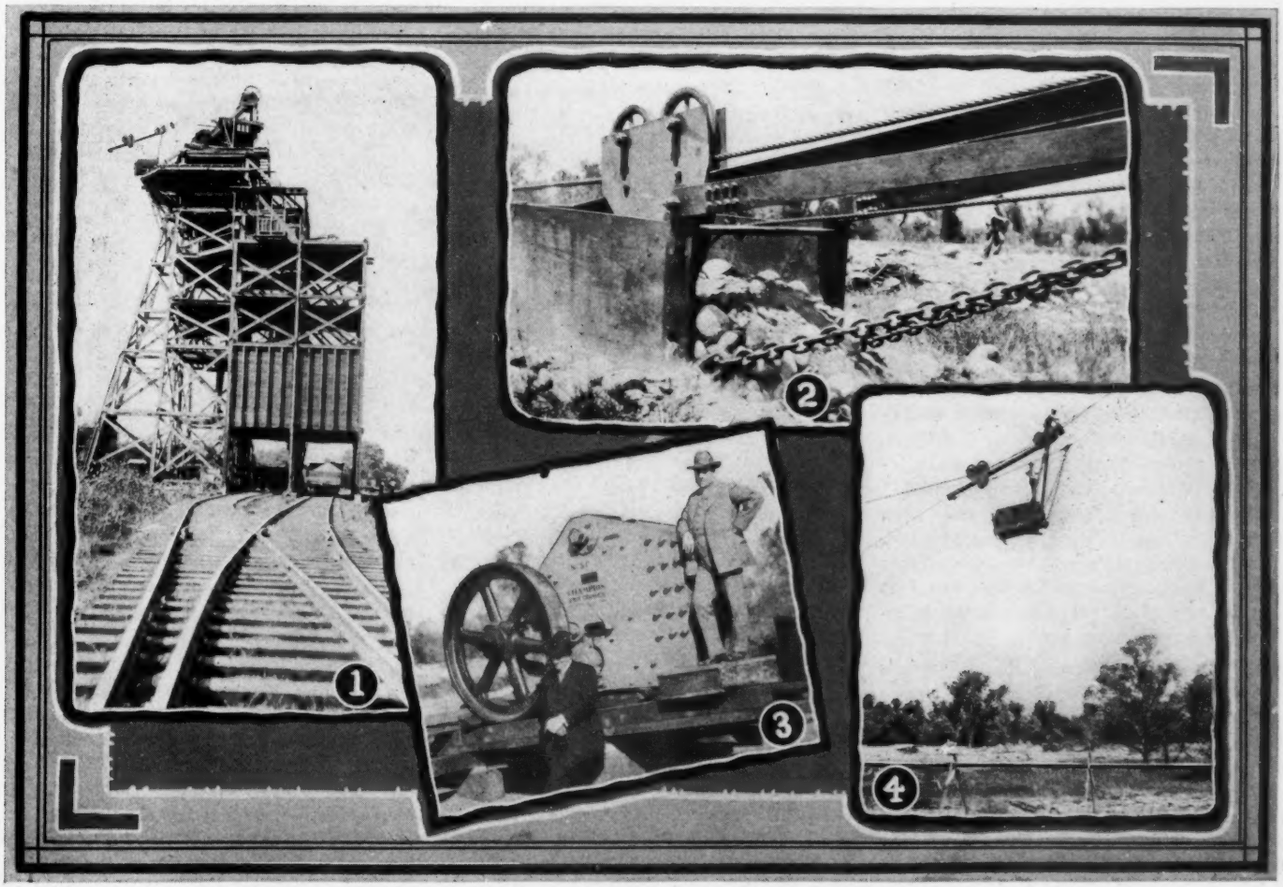
The track cable has a clear working span of 1000 ft. The bucket runs back by gravity. The large hoist has a loading speed of 300 ft. per minute and a traveling speed of 1200 ft. per minute, so that it takes just about a minute and a half to make a round trip over the span of 1000 feet.

The material is brought in by this bucket and dumped on a grizzly, which rejects all boulders over 13 in. in diameter. The material passing through the grizzly goes into a large hopper which holds approximately 300 tons. From there it is drawn through a gate and passes over another grizzly which rejects and sends to the No. 5C jaw crusher all material from 3 in. up. The material passing through this grizzly goes direct to a four-deck set of flexible-arm shaker screens, which are divided in the center. The crusher rock discharged from the jaw crusher travels down one side and the gravel down the other. The rejections from both sides of the upper deck of this screen, which is everything over 2¼ in. are elevated to a 36-in. disc crusher for reduction and are discharged from this crusher on the top deck of the crushed-rock side of the screens.

Battery of Shaker Screens

As stated before, these screens are made in four decks. The rejections from the top deck are sent to the disc crusher and the rejections from the second, third and fourth decks are discharged into their respective bins. The concrete sand and fine sand pass through the lower deck of the screen and are there discharged from a hopper into a large settling tank and log washer, respectively, where they receive their final washing. From there they are discharged into the storage bins.

The plant has ten storage bins of 100 tons



1—The Fresno plant, structure 125 ft. high with turn table on top. 2—Two cu. yd. bucket. 3—The crusher. 4—Taking an aerial trip along the 1000 ft. cableway to top of the plant

capacity each. From the storage bins, the material is drawn into railway cars for shipment, which makes the system gravity conveying throughout, with the exception of the one elevation from the screens to the disc crusher, which is done by a 37-ft. bucket elevator. All of the machinery in the tower is operated by a 75-hp. constant speed motor. The other motors are the variable speed type.

Washing System

The washing system is as follows: A 6-in. centrifugal water-balanced pump operated by a 40-hp. motor is used. This has a capacity of 1200 gal. per minute against a 100-ft. head. This water is lifted to the large hopper at the top of the plant, where a 4-in. stream of water plays on the material as it falls in.

As the material is drawn from this hopper and passes over the grizzly just ahead of the jaw crusher, a 4-in. stream of water strikes it. A 6-in. water pipe passes down the full length of the screens, 22 ft. long, and at every 12 in. of this pipe there is inserted a 2-in. jet with an arm on the lower end, which extends across the full width of the screens (about 4 ft.). These are perforated with holes and the water is discharged from them on to the material as it passes along the screens. All of the water goes through into the sand hopper and into the settling tank, where it overflows into a waste discharge. The material from the settling tank is taken out of the other end by means of a set of steel flights, which constantly revolve in this tank, so that when the material reaches the storage bins, it is absolutely clean.

LIBERTY NECESSARILY limits governmental efficiency. That is part of the price which we pay for freedom. We do not begrudge the price. We are prepared to pay any price for the supreme blessing of being free men,—if necessary, even the price of our very lives as many of those did, who procured for us the great legacy of liberty.—Otto H. Kahn.

Growth of Silica Rock Industry

Statistics Gathered by United States Geological Survey Showing Production and Values

THE demand for ganister, or quartzite, used in making silica brick, continued its remarkable growth in 1917.

According to statistics compiled under the direction of G. F. Loughlin, of the United States Geological Survey, in cooperation with the State Geological Surveys of Alabama, Illinois, Maryland, New York, Pennsylvania and Wisconsin, the total quantity of ganister sold in 1917 amounted to 1,295,851 short tons, valued at $1,350,798, an average of $1.04 a ton.

This was an increase of 435,895 tons, or about 51 per cent in quantity, and $820,-993, or 155 per cent, in value compared with 1916, when the average price was only 62 cents a ton. The increase in 1916 over 1915 was 50 per cent in quantity and 58 per cent in value. The marked advance in price in 1917 was due mainly to increased cost of production.

Pennsylvania, with 26 plants, continued to furnish the bulk of the output in 1917—1,003,623 short tons, valued at $1,113,675, or $1.11 a ton. These figures show an increase of 49 per cent in quantity and 171 per cent in value compared with 1916, when the average price was 61 cents a ton.

Railroad embargoes and shortage of cars have delayed shipments during the first part of 1918, but the price per ton is reported to have been as high as $1.50.

More than four-fifths of Pennsylvania's production in 1917 came from seven plants in Huntington County and six in Blair County, the remainder being distributed among 13 other plants in 10 counties. A small quantity of the output of one company in 1917 was sold to electrometallurgical companies, presumably for making ferro silicon.

Wisconsin, with 5 plants in operation, ranked second, with sales of 222,086 short tons, valued at $175,385, in 1917, a gain of 84,509, or 61 per cent, in quantity and $95,742, or 120 per cent, in value compared with 1916. The average price per ton advanced from 57 to 79 cents. Three producers in Colorado sold 35,255 short tons, valued at $32,137, and one company each in Alabama, Illinois, Maryland, New York, Ohio, South Dakota and Tennessee reported production in 1917.

Ferro-Silicon Quarry Is Leased in Maryland

CUMBERLAND, Md.—Having taken a royalty lease on 64 acres of land comprising a portion of the farm of John B. Gunning at Cresaptown, the Shawinigan Electric Product Co., of Baltimore, is preparing to open a large quarry to take out ferro-silicon, mineral. Two private switches to the quarry have been completed and the necessary machinery, including a large crusher, is being installed.

The mineral will be crushed at the quarry and sent to Baltimore to be smelted. This process requires a high degree of heat, it having been found impossible to get the desired effects from the use of coal-burning furnaces. A 36,000 electric horsepower generator is used. The chemist of the Shawinigan Electric Product Co. came to Cumberland in March, when the first samples were taken and tested.

Various Uses of Silicia Sand

PULVERIZED silica, quartz or ganster rock—glass sand—has a variety of uses in the arts.

In the pottery industry, where it is generally called flint, silica is used in the body of the ware to diminish shrinkage and is also used in glazes. Silica for use in pottery should contain less than 0.5 per cent of iron-bearing minerals. Manufacturers of paint use considerable quantities of very finely ground silica, which forms as much as one-third of the total pigment in some paints. For this purpose finely ground crystalline material is superior to fine sand in its natural state because of the angularity of the grains, which makes them adhere more firmly to the article painted and after wear affords a good surface for repainting. The same angularity makes artificially comminuted crystalline quartz superior to natural sand for use in wood fillers. For soaps and polishing powders ground material is preferred to natural sand on account of its whiteness and angularity. For all these purposes large quantities of pure quartz sand and sandstone are finely ground and yield a product fully equal to that obtained by grinding massive crystalline quartz.

Quartz crushed and graded to various sizes is used in making sandpaper and sand belts, as a scouring agent, for "frosting" glass with sand-blast apparatus, and for other purposes. Blocks of massive quartz and quartzite are used in the chemical industry as a filler for acid towers and as a flux in copper smelting. Ground quartz is also used in filters and in tooth powders and by dentists as a detergent.

Sand and crystalline quartz have been used in making silicon and alloys of silicon with iron, copper, and other metals in the electric furnace. Quartz may be fused in the electric furnace to make chemical apparatus, such as tubes, crucibles, and dishes.

The material known commercially in the United States as tripoli, which is the siliceous residue of decomposed limestones also yields an excellent grade of pulverized silica, which is used for the same purpose as silica powder obtained from massive crystalline quartz and from sands and sandstones. Diatomaceous (infusorial) earth is also used to make polishing powder that is employed for similar uses to those for which quartz, sand, and tripoli powders are employed, but diatomaceous earth has somewhat different properties and most of it finds different application, as insulating and filter material.

Labor Saving in Limestone Quarrying—II

Drilling and Loading Economies†

By Oliver Bowles

FOR MULTIPLE-BENCH, or snake-hole quarrying, tripod drills are generally used, though of late years large hammer drills have been used successfully by many operators. For ledges not exceeding 40 ft. in thickness wagon drills are successfully employed in a few localities.*

For single-bench quarrying, with the quarry face 25 ft. or more in height, churn drills are now widely used.

Labor Requirements of Various Drills

Tripod drills require two men each, a runner and a helper, except that in some instances one helper is deemed sufficient for two drills. Hammer drills require no helpers, and are therefore more economical of labor than tripods. Wagon or churn drills usually require two men each though some electrically operated churn drills employ only one man each.

The churn drill, while it is a comparatively recent type of equipment in limestone quarries, is rapidly gaining in favor and is in successful use in a great many places. While there are conditions where it is claimed that other types of drills render better service, from the standpoint of labor requirements the churn drill has this advantage that it accomplishes the work of four or five tripods or hammer drills with no greater labor than is required for a single tripod. A quarry operator in Pennsylvania claims that one churn drill, one tripod, and one hammer drill accomplish as much as was formerly done in the same quarry with five tripods and three hammer drills. Estimating the labor requirement conservatively the old method would require 11 men and the new method 5.

One Texas operator reports that when he employed five tripod drills his plant was frequently shut down through lack of rock; and when one churn drill was substituted for the five tripods the plant was continually supplied, and the drill was used part of the time only.

As in the case of stripping, the relative direct cost of drilling with various types of equipment is a fair measure of their relative labor requirement. S. R. Russell ‡ in an article entitled "Loading and Shooting Big Blast Holes," estimates that the average cost of steam tripod drilling is about 8 cents per cubic yard of rock quarried, while the average cost of churn drilling is about 2 cents. These figures indicate that the churn drill promotes labor economy.

When churn drills are employed, not only is there a decided saving of labor in the actual drilling process, but their employment may also result in a marked saving of labor in other departments. Where tripod drills are employed in deep quarries the face must be worked down in a series of benches. Bench cleaning is therefore necessary, and tracks must be moved frequently. One quarryman reports that the introduction of churn drills released 15 men formerly employed in operations now rendered unnecessary by the introduction of the new equipment.

Blasting; Limited Labor Saving in Mechanical Processes

The actual loading, tamping, and wiring of charges in drill holes are processes in which there is little variation in method, and moreover little labor is involved in these operations. There is, therefore, no way in which any appreciable amount of labor may be saved by modifying the mechanical processes connected with blasting.

Waste of Labor Through Inefficient Blasting

While the actual processes of loading and tamping drill holes afford no means of appreciably conserving labor, blasting efficiency has a direct bearing on the labor required in subsequent operations. Improper arrangement of drill holes, imperfect balancing of charges, or the use of too powerful or too weak an explosive may result in a very inefficient blast, and as a consequence rock loading may be greatly hampered. There is in fact no other department of the quarry in which inexperience or lack of judgment may in a brief period occasion more disastrous consequences. This is particularly the case where many large blasts are fired simultaneously in deep churn-drill holes, for the mass of rock thrown down may occupy the rock loaders for a period of several weeks or even months. If the rock is imperfectly shattered, or improperly thrown down excessive secondary blasting may be required, and the process of loading may be slow and difficult throughout the entire period. On this account it is false economy, both of money and labor, to employ cheap and inexperienced men for blasting foremen.

Reduction in Labor by Efficient Blasting

If on the other hand blasting is done by an experienced man of good judgment, subsequent operations may be greatly simplified. If the rock is thoroughly shattered, little labor is required for secondary blasting, and if the rock fragments are thrown down in a way that permits easy handling, loading operations may be performed rapidly and with minimum effort.

The Employment of Blasting Experts

A realization of these facts has led some operators to engage the services of blasting experts who are not permanent members of any quarry organization, but who travel about from quarry to quarry as their services are desired. The expert, in accordance with his judgment, developed by long experience, supervises the arrangement and spacing of drill holes, selects the explosive, proportions the charge for each hole, carefully inspects or tests all connections, and fires the charge. The efficiency of the results usually obtained amply justifies the employment of such experts.

Factors Governing Secondary Blasting

The labor required for secondary blasting depends on various factors, the chief of which are efficiency of primary blasting, the physical character of the rock, the method of rock loading, and the method of secondary blasting employed. These factors are considered in the following paragraphs.

Effect of Primary Blasting Efficiency

If the rock ledge is thoroughly shattered by the primary blast, very little secondary blasting may be required. If, however, the primary shot merely fractures the ledge with the production of numerous large solid blocks, much secondary blasting may be needed to reduce the blocks to convenient size. It is evident, therefore, that the extent of secondary blasting is in a large measure dependent upon the efficiency of primary blasting. As pointed out in a previous paragraph, the employment of an expert blaster for primary shots tends to eliminate much of the secondary blasting.

Effect of Physical Character of Rock

Rock that is schistose in character is usually shattered effectively by the primary blast. Where schistosity is only moderately developed the rock has a tendency to split out in long thin slabs. This is known among quarrymen as "slab cleavage." In most limestone quarries, however, the rock is massive and tends to break into more or less cubical blocks. Such rock is said to possess "cubical cleavage." Where steam shovel loading is employed, rock having slab cleavage requires less secondary blasting than that with cubical cleavage, for a rock crusher will accommodate a larger mass in the form of a long thin slab than it will in cubical form. Schistosity, therefore, tends to reduce the necessity for secondary blasting. In some of the schistose cement-rock deposits of the Lehigh District of Pennsylvania, the rock is

*Bowles, Oliver.—Work cited, pp. 39-40.
†War Minerals Investigation Series, No. 1, U. S. Bureau of Mines, Washington, D. C.
‡Blast-hole Drilling with Keystone Cable Drills," published by Keystone Driller Co., Beaver Falls, Pa., 1915, p. 10.

so thoroughly shattered by the primary blast that little or no secondary blasting is required. Few quarries for the production of blast-furnace flux are of this type as the rock is usually massive in character.

Where vertical open seams are spaced 6 to 8 ft. apart there is a tendency for the primary blast to push out large solid masses that require excessive secondary blasting. A method of dealing with such an unfavorable condition is discussed in detail in a previous publication* in which it is pointed out that at least one of the blast holes for the primary shot should be located in each rock mass between seams, for thereby each mass is shattered. On the other hand any large mass that is not penetrated by a drill hole is simply pushed out. It is evident, therefore, that the amount of secondary blasting required in connection with unsound rock ledges is largely dependent on the skill employed in primary blasting.

The toughness of the rock is also an important factor in this connection. Tough rock with few seams or bad planes tends to break into large cubical masses requiring maximum secondary blasting. The proper method of dealing with such rock can usually be determined only by experience. By varying the diameter, spacing, and burden of primary drill holes, or by varying the amount or grade of the explosive the blast foreman may be able to arrive at a combination that will promote effective shattering and thereby reduce the secondary blasting requirement.

Effect of Rock-Loading Method

If the rock is loaded by hand the fragments must be small enough for one man to handle, or must at least be small enough to be easily sledged to one-man size. If many large blocks result from the primary blast, much secondary blasting may, therefore, be necessary where hand loading is employed.

Where a steam shovel is used for rock loading, especially if the shovel is equipped with a dipper with a capacity of 3 to 4 cubic yards, large rock masses may be loaded, and secondary blasting may be reduced to a minimum.

Importance of Rock Loading

Rock loading is an important department in the quarrying of limestone; in fact, in many quarries, more labor is required in this than in any other branch of the work. In some localities, the cost of loading is one-third to one-half of the total cost of quarrying. In this branch of the industry, therefore, special efforts should be made to conserve labor.

Loading Methods

There are in common use two distinct methods of loading rock in the quarry. In some quarries the rock is shattered by blasting into fragments that one man can handle, or to sizes that can be readily reduced to one-man size by sledging. These fragments are then loaded into cars by hand.

In many quarries hand loading has been superseded by the use of power shovels operated by steam, electricity, or compressed air. The advantages and disadvantages of these two methods have been discussed in a former publication.† For quarrying fluxing limestone the most obvious advantage in the hand-loading method is the ability of the hand loader to select the desirable and to reject the inferior material. Thus when hand loaded the rock may be hand picked. Where steam shovels are employed such selection is not possible; if siliceous material is shot down with the rock it must be loaded with the rock and separated subsequently by screening or washing.

Labor Requirement of Hand-Loading Method

The rock tonnage loaded by hand per man per day varies greatly in different localities. Thus in one of the largest fluxing quarries of the Birmingham district of Alabama the loaders average about 18 tons per man per day, in a Western Pennsylvania quarry they average only 15 tons a day, and in two Eastern Pennsylvania quarries they average 25 and 30 tons, respectively, per day. An average of several quarries, some for the production of limestone for Portland cement and some for the production of limestone flux, is 20 tons per man per day. Thus a quarry producing 1,000 tons of rock per day requires an average of about 50 loaders.

Labor Requirement of Steam-Shovel Loading Method

The labor requirement for steam-shovel work is variable as it depends on the size of the shovel employed and on the conditions under which it operates. In one Eastern Pennsylvania quarry a small tractor shovel with a ¾-yard dipper requires a maximum of 3 men and loads a maximum of 400 tons a day. It is claimed by the quarry foreman that it can accomplish as much work as 12 hand loaders though in ordinary practice it does the work of 7 or 8. A shovel of this type, therefore, saves the labor of 4 or 5 men for an output of 250 to 300 tons per day. In another Pennsylvania quarry it is claimed that two steam shovels employing 10 men in all load as much rock as 45 men by hand methods.

In one Western New Jersey quarry a steam shovel employing 3 shovel men and 4 pit men loads 1,200 tons per day, or an average of 171 tons per man per day. In one Eastern Pennsylvania quarry two steam shovels requiring the services of a total of 16 men load 1,000 tons a day, or an average of only 63 tons per man per day. Figures obtained at various quarries in widely separated localities indicate that an average of about 128 tons of rock per man per day is loaded by the use of steam shovels.

The above figures indicate that a material saving of labor may be accomplished by the use of steam shovels for loading rock, and they are now in operation in many quarries. Hand-loading methods are still employed, however, in many places. While various objections may be raised to the employment of power shovels the saving of labor that may be effected by their use should demand careful consideration on the part of all operators who still maintain hand-loading methods, and an effort should be made to employ them wherever possible. While, on account of war conditions, steam-shovel equipment has increased greatly in price, it is probable that the increased cost is not out of proportion to the increased wages for laborers.

(To be continued.)

*Bowles, Oliver.—Rock quarrying for cement manufacture, Bulletin 160, Bureau of Mines, pp. 50-51.

†Bowles, Oliver.—Rock quarrying for cement manufacture. Bulletin 160, Bureau of Mines, pp. 118-124. (In press.)

Demand for Agricultural Lime and Flux Increasing

IN ORDER to meet the increasing demand for limestone for fluxing purposes and for agricultural and other uses, two of the producing companies who have recently made improvements and additions to their equipment are the Bessemer Limestone Co. of Hillsville, Pa., and the Bluffton-Lewisburg Stone Co. of Lewisburg, Ohio.

The Bluffton-Lewisburg Stone Co. is filling a large order for flux received from a steel mill at Portsmouth, and daily shipments of six cars are being made. It will take at this rate more than half a year to fill the order, as 200 cars were contracted for.

Besides, the company is also filling orders from four beet sugar factories for their usual requirements of stone used in refining sugar and a big order for cement stone shipped to Cement City, Mich.

A lot of new machinery has been installed and both plants of the company are prepared to run full blast to get out the big orders.

General Manager E. T. Paul has held a conference with government officials at Washington to discuss the merits of Lewisburg stone for the new government nitrate plants. Judged from the analysis it is admirably adapted for nitrate purposes.

The additional machinery installed at the quarries of the Bessemer Limestone Co., Hillsville, Pa., involve an expenditure of $40,000, according to the general manager, Fred Kanengeiser.

The improved facilities include washing and screening apparatus. The improvements will enable the company to increase its output of both stone and agricultural limestone.

At present the Bessemer Limestone company is producing stone of all kinds at the rate of about 70,000 tons a month, and employs 250 men. Its production is steadily increasing and it is estimated the output this year will approximate 650,000 tons.

New Phosphate-Lime Fertilizer Made in Italy

Grinding and Roasting Ground Rock Phosphate and Calcium, Sodium and Magnesium Carbonates

IN VIEW of the attention now being given everywhere to increased production and of the relation that fertilizers bear to agriculture, it is of more than ordinary interest to note that a new fertilizer called tetraphosphate, is being manufactured in Italy, which, according to technical experts, is equally as good if not better than superphosphates, which contain the same amount of phosphoric acid, and which costs considerably less to produce.

"Tetra," as it is known in commerce, was invented by Professor Stoppani, of Bologna, in 1914, and the process was patented and purchased by an Italian company, which has undertaken to exploit the invention both in Italy and abroad. Considerable progress has been made since 1914 in the industry in Italy, notwithstanding the difficulties at present in obtaining the phosphate rock and reactive agents. There are 11 plants in operation, 7 of which are administered by the Italian Agricultural Syndicate. The production amounts to 500,000 quintals a year, a supply which, it is stated, is far from meeting the demands of the Italian farmers. Four new plants are in process of construction.

Another plant is now being worked at Debajeh, near Luxor on the Nile, the production of which is 200,000 quintals a year, and a similar plant is being erected at Kaseir on the Red Sea, where after the war it is hoped to manufacture not less than 2,000,000 quintals a year. The rock found in these districts is very rich, viz., 60 per cent and 70 per cent, respectively.

Method of Manufacture—Advantage Over Superphosphates

The fertilizer is manufactured very simply as follows: In a specially constructed furnace the natural phosphate-rock powder is roasted for several hours at a temperature varying from 600 to 800 deg. C., together with a powder, constituting about 6 per cent of the mixture and forming a reactive agent and composed of equal parts of calcium, sodium, and magnesium carbonate, with a small proportion of sodium sulphate. After leaving the furnace the product is hydrated by cold phosphoric acid and for practical use is mixed with sand or dry earth until the necessary strength is obtained.

From experiments undertaken by a special commission appointed by the Italian Minister of Agriculture the use of this new fertilizer on wheat, rice, potatoes, oats, beans, and clover, has given favorable returns, and its fertilizing quality has been pronounced equal and sometimes superior to superphosphate, over which it is claimed to have the following principal advantages:

1. Freedom from causticity, acidity, and deterioration.

2. Simple and less costly manufacture. The cost of a plant to manufacture, for example, 100,000 quintals of superphosphate by the acid process, with lead at the present price of 1 franc per kilo would be approximately 1,000,000 francs, as compared with 150,000 francs for a "tetra" installation of the same power and output.

Lime in Relation to Soil Acid

POOR DRAINAGE in soil is quite comparable to poor circulation in the animal body. In either case toxic or poisonous substances are allowed to accumulate and the soil or the animal body becomes sickly. Just as a good, vigorous circulation in the animal body eliminates all broken down tissues and other toxic, effete matters, thus making possible the development and maintenance of a strong, healthy physical condition, so, good surface and sub-drainage of lands, by leaching out into the drainage channels the acids and other poisons that would otherwise accumulate in the soil, make possible the development and maintenance of fertility conditions that are found absent in waterlogged soils. There seems to be a very close relationship between animal metabolism and what might be termed soil metabolism. The life processes of the one are comparable to the life processes of the other.

The first step in the reclamation of acid lands is thorough drainage. The second step is deep plowing and thorough cultivation to secure the proper aeration of the soil. The third step is the use of liberal amounts of ground limestone. The ground limestone will correct any lingering acids and very rapidly promote the activities of the nitrate-forming bacteria which in turn breaks down, conserve, and render available the otherwise insoluble mineral constituents of the soil—phosphate, potash, magnesia, soda, etc.—Bulletin 245, North Carolina Department of Agriculture.

Production of Rock Products in British Columbia

THE PRODUCTION of Portland cement in British Columbia in 1917 was valued at $587,829; lime and limestone, $102,223; crushed rock and flux, $138,830; sand and gravel, $61,642.

The production of Portland cement in the province is made by two companies, namely, the Vancouver Portland Cement Co. with works at Tod Inlet and the Associated Cement Co. with works at Bamberton, both in Victoria division in the southern part of Vancouver Island. The combined production for 1917 was valued at $487,829 compares with $436,459 in 1916.

The outputs of sand and gravel are slightly less than in 1916 but the decrease is not serious. The output of cement shows an increase.

It is stated that nearly $100,000 worth of limestone (included in the item "crushed rock and flux") was quarried for use as flux in the smelting works of the Granby Consolidated Co. at Anyox and the Consolidated Mining & Smelting Co. at Trail.

Organize 7th District of Mineral Aggregates

CHATTANOOGA, Tenn.—The crushed stone, slag, sand and gravel operators of the Seventh District of the War Service Committee on Mineral Aggregates organized October 22 at the Patten hotel. H. G. Ireland of the Birmingham Slag Co. was elected chairman and W. S. Holmes of the Chickamauga Quarry & Construction Co., Chattanooga, Tenn., secretary. District committeemen were appointed as follows:

Memphis: A. A. Dodson, Missouri Portland Cement Co.

Nashville: T. L. Herbert, T. L. Herbert & Son.

Louisville: R. B. Tyler, R. B. Tyler Co.

Birmingham: C. E. Ireland, Birmingham Slag Co.

Knoxville: A. Harris, Holston Quarry Co.

Chattanooga: John R. Evans, Jackson Stone Co.

Further Curtailments by Priorities Division

WASHINGTON, D. C.—The Priorities Division of the War Industries Board, for the purpose of conserving material, labor, fuel transportation and capital has announced additional curtailments. Among them is one affecting road-making machinery:

Six months from October 1, no road-making machinery or any part thereof shall be manufactured, except (1) repair parts; (2) for work on railroads and other public utilities; (3) for roads repaired by the U. S. Government, states, counties and municipalities; (4) for new construction by the U. S. Government directly or indirectly.

Agricultural Lime for Orchards

Ohio Experience Shows How to Increase Yields

IN AN INTERESTING booklet entitled "The Story of Lime and Its Uses," published by the A. & C. Lime Co. of Canton, Ohio, will be found some very instructive data regarding the use of lime in the orchard. The mere production of fruit does not draw heavily on the lime supply in a soil, for a ton of apples, for example, contains only about .36 of a pound of calcium carbonate. But in the production of the tree, upon which this fruit is grown, there is quite a different story to tell. A ton of apple wood contains 97.80 pounds of calcium carbonate and a ton of peach wood 96.64 pounds of calcium carbonate. And it is equally true that the bark and leaves, in their development, draw rather liberally on the lime stored in the soil. This means, in the final analysis, that the flavor, the size and the health of the tree and fruit are all affected by the supply or lack of lime in the soil.

It has been found true that most of the large, successful commercial orchards are located in limestone territory, where the soil is naturally rich in lime. In this territory, that need in the soil must be supplied artificially if the greatest success is to be attained in fruit growing. It is recognized as good practice to grow clover or some other legume in the orchard for plowing under. If the lime were not needed for trees, it would be an essential to the successful production of such green maturing crops.

In the booklet mentioned will be found related the interesting experience of L. A. Callahan, of Salem, proprietor of Highland Fruit Farm, in Wayne township, Columbiana county, Ohio. Reference has been made before in this paper to the remarkable success attained by Mr. Callahan in his orcharding experiment. In June, 1913, he purchased an old orchard of twenty-three acres, containing 650 trees. He spent two months cleaning it up, pruning and spraying. In the fall of that year he applied 50 pounds of hydrated lime around the roots of each tree and mulched with straw. A picture of one of these trees is reproduced as it looked before pruning and liming. It produced just $2.50 worth of apples that year, and hardly one of the apples was a good marketable specimen. It required 156 apples to fill a half bushel measure. The following year the tree produced 22½ bushels of fine marketable fruit and just 52 of the 1914 apples were required to fill a half bushel measure. That year the total crop of marketable apples was 1,800 bushels, and the following year, when the full effect of the lime, mulch, fertilizer, pruning and spraying had had an opportunity to make itself felt, the crop on these trees was 4,130 bushels of the finest market apples. Mr. Callahan does not need to be convinced that liming pays in the orchards as well as elsewhere on the farm.—From "Farm and Dairy."

Increase in Production of Marl in 1917

THE marl sold for agricultural use in the United States in 1917 amounted to 73,900 short tons, valued at $165,223, compared with 58,088 short tons, valued at $144,768, in 1916, an increase of 25 per cent in quantity and 13 per cent in value. The average price, however, unlike that of nearly all other commodities, decreased from $2,32 to $2.21 a ton.

Of the total output, 47,914 tons, valued at $112,075, or $2.35 a ton, was freshwater marl, a calcareous ooze consisting mainly of an accumulation of small shells formed of carbonate of lime and of minute crystals deposited from the same material by the action of bacteria. This output came from nine companies—three in Virginia, two in California, and one each in New York, Pennsylvania, West Virginia, and Arkansas. The production in 1916 was 48,447 tons, valued at $126,345, or $2.60 per ton, and was made by seven companies—three in Virginia, and one in each of the other states named except West Virginia.

Marine marl, derived from fragments of marine shells, loose or partly consolidated, was produced by five companies in the Coastal Plain region of North Carolina and South Carolina, the output amounting to 25,986 tons, valued at $53,148, or $2.35 a ton, in 1917, compared with 9,641 tons, valued at $18,423, or $1.91 a ton, in 1916.

The above figures were compiled under the direction of G. F. Loughlin, United States Geological Survey, Department of the Interior, from reports of producers and in co-operation with the State Geological Surveys of New York, North Carolina, Pennsylvania, and Virginia.

New Use for Lime on the Farm

WHEN storing shelled beans for winter use they can be protected from weevils by placing them in a receptacle with air-slaked lime. About equal parts by weight of lime and beans are used, the lime being sprinkled through the beans in the container. This will prevent the development of weevils and not injure the beans for food or seed.

Weevil infested beans, peas, breakfast foods, flour or meal should be heated in the oven at 118 to 125° F. which will kill all stages of the insects. They can then be separated from the cereals by sifting and from the sound beans or peas by submerging these in water and swimming off the infested seeds. T. H. Parks, the Ohio State University.

Agricultural Lime Is Essential

All Other Fertilizer Elements Useless if Lime Is Not Present in the Soil

LIME is one of the essential plant foods. It takes an essential part in plant growth, and whenever withheld the growth is checked. Plants grown in soils deficient in lime lack hardiness. They are unable to withstand drought and other unfavorable cultural and climatic conditions. Lime accumulates mainly in the leaves and stems of the plants, where it takes a most important part in the production of new tissues.

The action of lime on soils well stocked with potash results in the fixation of the lime and liberation of the potash. Boussingault found that where clover was limed there was present in the crop three times as much potash as in a similar crop not limed.

Lime, therefore, is just as essential to plant life as nitrogen, phosphoric acid, and potash. The land may be rich in all essential elements and still be worthless if it does not contain a sufficient amount of lime. Clover and other legumes grown in such soils are stunted. The leaves are sickly and yellow. Alfalfa without lime will hardly survive after the first year, and cowpeas and vetch are a failure where lime is absent. Other crops show a similar stunted growth in soils deficient in lime. It is safe to say that the productiveness of many of our fertile farms is reduced 50 per cent simply because they do not contain the required amount of lime. Originally most of our soils contained a sufficient quantity of lime, but continuous cropping has reduced the content of lime to such an extent that the soil is unhealthy. Unless the natural supply of lime in the soil is abnormally large the soil becomes infested with toxic substances and plant-disease germs. Nitrifying bacteria which form nitrates will not live in an acid or sour soil.

The presence of sufficient lime in the soil prevents the soluble phosphoric acid applied in the fertilizer from satisfying its hunger for a base by combining with iron and alumina—undesirable because phosphates of iron and alumina are very slowly soluble. Where lime is present the phosphoric acid will take it by preference, and the reverted phosphate thus formed is much more available than the phosphates above mentioned.—Bulletin No. 245, North Carolina Department of Agriculture.

New York State Rules and Regulations Governing Quarry Practice

Law, Section **119.** *Protection of employees in mines, tunnels and quarries.—Every necessary precaution shall be taken to insure the safety and health of employees employed in the mines and quarries and in the construction of tunnels in the state. The industrial board shall have the power to adopt rules and regulations to carry into effect the provisions of this article and may amend or repeal rules and regulations heretofore prescribed by the commissioner of labor under the provisions of this article. The rules and regulations heretofore prescribed by the commissioner of labor under this article shall continue in force until amended or repealed by the industrial board.*

Definition of Terms

(a) Application. These rules shall apply to all quarries in the State of New York producing minerals within the meaning of that term, as hereinafter defined.

(b) Singular and plural numbers. For the purpose of these rules, the singular number when used in reference to persons, acts, objects, and things of whatsoever kind and description, shall, whenever the context will permit be taken and held to import and include the plural number, and the plural number shall similarly be taken and held to import and include the singular.

(c) The term "quarry" shall include excavations, prospect openings, pits, banks and open cut workings employing an average of five (5) or more men, and shall embrace any and all parts of the property of such quarry and quarrying plant that contribute directly or indirectly to the quarrying of minerals. Provided, that when a group of workings in proximity to one another and under one management are administered as distinct units, each working shall be considered a separate quarry.

(d) Mineral. The term "mineral" shall mean whatever is recognized by the standard authorities as mineral, whether metalliferous or non-metalliferous, but shall not be held to embrace or include coal, lignite, gas, oil, or any substances when extracted in solution or in the molten state through bore holes.

(e) Operator. The term "operator" shall mean the person, firm or body corporate in immediate possession of any quarry and its accessories as owner or lessee thereof, and as such responsible for the condition and management thereof.

(f) Superintendent. The term "superintendent" shall mean the person having immediate supervision of the quarry.

(g) Quarry Foreman. The term "quarry foreman" shall mean a person who at any time is charged with the general direction of the quarry work.

(h) Explosive. The term "explosive" or "explosives" shall be held to mean and to include any chemical compound or any mixture that contains any oxidizing and combustible units or other ingredients in such proportions, quantities or packing that an ignition by fire, by friction, by concussion, by percussion, or by detonation of any part of the compound or mixture may cause such a sudden generation of highly heated gases that the resultant gaseous pressures are capable of producing destructive effects on contiguous objects or of destroying life and limb.

(i) Magazine. The term "magazine," as used in these rules, shall be held to mean and include any building or other structure or place in which explosives are stored or kept, whether above or below ground.

(j) Person. The term "person" shall be held to mean and include a firm or body corporate as well as natural persons.

(k) Employees. The term "employees" and "men employed" shall be held to mean all men receiving compensation from the operator, directly or indirectly, for labor or services performed in connection with the quarries.

(l) Approved. The term "approved" shall be held to mean approved by the Industrial Commission.

General

(a) The operator and superintendent of every quarry shall use every reasonable precaution to insure the safety of the workmen in the quarry in all cases, whether provided for in these rules or not.

(b) All defects in or damage or injury to machinery or timbering or to apparatus and equipment generally in and about a quarry, all unsafe or dangerous conditions in any part of the quarry, and all accidents occurring in the course of quarrying operations, other than those of a purely minor character, even though not resulting in personal injury, shall be promptly reported to the quarry foreman or superintendent by the person observing the same.

(c) Wages shall not be paid on any premises used for the sale of intoxicating liquors.

(d) Each workman employed in the quarry, when first engaged, shall have his attention directed to the general and special rules provided for in these rules.

Superintendent

The operator of every quarry shall appoint a man who shall be personally in charge of the quarry and the performance of the work done therein, who shall be designated as the "superintendent;" provided, however, that nothing herein contained shall prevent the owner or operator of any quarry from personally filling the office of superintendent.

The superintendent of every quarry shall inspect or cause some competent person or persons appointed by him to inspect all quarrying appliances, boilers, engines, magazines, explosives, bell ropes, speaking tubes, telephones, tracks, ladders, dry closets, and all parts and appliances of said quarry in actual use, and any such person or persons appointed by the said superintendent shall at once report any defects therein to the superintendent. It shall be the duty of the superintendent upon ascertaining such defects to take immediate steps to remedy the same so as to make the same comply with the provisions of these rules, and he shall forthwith notify the operator of said quarry of the existence of such defects. It shall be the duty of the superintendent to appoint a competent man to have full charge, under the direction of said superintendent, of every magazine containing explosives situated on said quarrying property, and to make such other appointments and perform such other duties as are provided by these rules to be performed by such superintendent.

Care of Injured

It shall be the duty of operators, superintendents, or anyone in charge of any quarry to keep at such place about the quarry as may be designated by the inspector, a stretcher, a woolen blanket and a waterproof blanket in good condition for use in carrying any person who may be injured at the quarry. Where more than one hundred (100) persons are employed, two (2) stretchers, two (2) woolen blankets and two (2) waterproof blankets shall be kept. At all quarries an adequate supply of materials shall be kept readily accessible for the treatment of anyone injured and shall include the following in suitable quantity: First-aid outfits consisting of one extra long gauze bandage with compress sewed in its center, one triangular bandage with methods of application printed thereon, two safety pins, and one card of instructions; large first-aid dressings for wounds; packages of sterilized gauze; assorted bandages; United States Army torniquet; carbolated vaseline or boric acid ointment; packages of picric acid gauze; wooden or wire gauze splints;

packages of absorbent cotton; safety pins; shears; tweezers; aromatic spirits of ammonia; paper cups; first-aid book of instructions; soap; basins; towels. Furthermore, in all quarries where one hundred (100) or more men are employed, a first-aid corps shall be organized, consisting of the foreman or foremen, shift bosses, timekeepers, or other employees designated by the superintendent; and it shall be the duty of the operator or superintendent to cause the organization of such employees and to procure the services of a competent person to instruct the members of such first-aid corps from time to time, not less than once in every three months, in the proper handling and treatment of injured persons before the arrival of a physician; except that where a hospital is maintained in connection with a quarry, there shall be provided only such first-aid equipment as may be reasonably necessary to prepare the injured employee for removal to the hospital.

Storage of Explosives

(a) The daily supply of explosives in a quarry shall be kept in a stout, tight box with hinged lids, which shall be kept securely locked, except at such times as explosives are being placed therein or removed therefrom, from which explosives shall be removed only as required for immediate use by the authorized blaster.

(b) No detonators shall be taken into any magazine containing other explosives. No fuses shall be capped with detonators in any magazine or in any other place where detonators or other explosives are stored, but special benches shall be provided at least twenty (20) feet from such storage places, where all fuses shall be capped. Cap crimpers shall be furnished in sufficient quantity to avoid the necessity of crimping in any other way. No detonator shall be transported with other explosives, except when made into a primer with such other explosives.

(c) All magazines shall be bullet-proof.

(d) When supplies of explosives or fuse are removed from a magazine, those that have been longest in the magazine shall be taken first. Packages of explosives shall be removed to a safe distance from the magazine before being opened, and no such packages shall be opened with any metallic instrument.

Marking of Explosives, Detonators and Fuses

It shall be unlawful for the operator or superintendent of any quarry to permit the use within such quarry of any explosive, or any blasting caps or detonators or fuse, unless there shall be plainly printed or marked in code if key is furnished, on every original package containing explosives, the name and place of business of the manufacturer of such explosive, the date of its manufacture and its character and grade, and on every original package containing such fuse, the name and place of business of the manufacturer of such fuse, the date of its manufacture; and on every original package containing blasting caps or detonators, the name and place of business of the manufacturer of such blasting caps or detonators and the date of their manufacture, and their grade.

It is recommended that employers provide common or safety fuse of uniform speed, preferably ninety (90) seconds per yard.

Conveying, Thawing, Blasting, Misfires

(a) The superintendent in all quarries shall appoint a sufficient number of experienced blasters to handle explosives and to do blasting.

(b) All foremen and gang bosses shall be experienced blasters and shall supervise the handling of explosives and see that blasting operations are carried on in accordance with the rules and regulations herein prescribed.

(c) Detonators shall not be carried with other explosives, nor shall any person ride in the same cage, skip or car with explosives.

(d) No blaster shall attempt to use any dynamite that is frozen, nor detonators of less than No. 6 strength.

(e) No quantity greater than is sufficient for daily use shall be artificially thawed at one time.

(f) Only approved methods of thawing shall be permitted.

(g) Fuse may be kept with detonators and all crimping of caps on fuse shall be done with proper crimper and at least twenty (20) feet away from explosives.

(h) No tools or other articles shall be kept with the explosives or with the detonators, except that the detonator chest may contain one or more crimpers, and the explosive chest may contain a hard wood wedge and mallet.

(i) All drill holes shall be of sufficient bore to admit of the free insertion to the bottom of the hole of a cartridge of explosive without ramming or removing the dynamite from its original wrapper, except for block holes.

(j) Fuse shall not be laced through cartridge for forming a primer.

(k) Foreman or shift boss shall, before drilling is commenced on any shift, ascertain whether all holes fired on the previous shift have been exploded, and shall cause all remaining holes to be examined with a wooden stick for unexploded charges or cartridges, and if any are found, same shall be refired or a new hole drilled and fired before regular drilling is commenced.

(l) Explosives shall not be extracted from a hole which has once been charged; the tamping only may be withdrawn sufficiently to allow a missed shot being fired by insertion of fresh additional charge of primer.

(m) Blaster shall be furnished with hard wood rods for tamping and he shall not tamp or load any hole with a metal bar, nor shall the wooden rod have any metal parts; except that where black powder with no detonator is used, tamping will be permitted with a copper-tipped tamping rod.

(n) Firing shall be done by safety fuse or approved battery or from an electric current of not over two hundred and fifty (250) volts, provided a suitable switch is used, as hereinafter described. Other methods of firing may be permitted upon application and approval by the Commission.

(o) When firing by electricity from power or lighting wires in any quarry, a proper switch shall be furnished with lever down when "off." The switch shall be fixed in a locked box to which no person shall have access except the blaster. The lead wires shall be furnished with plugs and shall not be connected with the switch till ready to fire. After blasting, the switch lever shall be pulled out, the wires disconnected, and the box locked before any person shall be allowed to return, and shall remain so locked until again ready to blast.

(p) All power lines and electric light wires shall be disconnected at a point outside the blasting switch before explosives are taken in and loading of holes is proceeded with. No current by grounding of power or lighting wires or banded rails shall be allowed beyond blasting switch after explosives are taken in preparatory to blasting, and under no circumstances shall grounded current be used for exploding blasts.

(q) The blaster shall cause a sufficient warning to be sounded and shall be responsible that all persons retreat to safe shelter before he sets off blast, and shall also see that none return until he reports it safe for them. He shall report to the quarry foreman and furnish names of all persons refusing to obey his caution. Suitable and convenient shelters shall be provided.

(r) When a blaster fires a round of holes, he shall count the number of shots exploding, except in case of instantaneous blasting by electricity. If there are any misfires, he shall report the same to the gang boss or foreman. The blaster shall not leave until he has placed a wooden plug painted red, or other proper danger signal, in the mouth of the missed hole. If a missed hole has not been fired at the end of a shift, that fact, together with the position of the hole, shall be reported by the quarry foreman or shift boss in charge of the next relay of quarrymen, before work is commenced by them.

(s) No person shall be allowed to deepen holes that have previously contained explosives.

(t) All wires in broken ore or rock shall be carefully traced and search made for unexploded cartridges.

(u) Whenever blasting is being done at points liable to break through to where other men are at work, the foreman or person in charge shall, before any holes are loaded, give warning of danger to all persons that may be working where the blasts

may break through, and he shall not allow any holes to be charged until warning is acknowledged and men are removed.

(v) Blasters, when testing circuit through charged holes, shall use sufficient leading wires to be at a safe distance, and shall use only approved types of galvanometers. No tests of circuits in charged holes shall be made until men are removed to safe distance.

(w) A daily record of all misfires shall be kept at the quarry office, giving name of loading blaster and name of blaster that refired it.

Intoxicating Liquor Prohibited in Quarries

No person shall, while under the influence of intoxicating liquor, enter any quarry, or any of the buildings connected with the operation of the same, where quarrymen or other workmen are employed, nor shall intoxicating liquors be brought into any such places.

Provided, however, that nothing herein contained shall prevent the carrying of any alcoholic spirits or other stimulants into such quarry or buildings for the purpose of administering to anyone injured therein.

Definition—Electrical Equipment

(a) Potential and Voltage. The terms "potential" and "voltage" are synonymous and mean electrical pressure.

(b) Difference of Potential. The expression "difference of potential" means the difference of electrical pressure existing between any two points of an electrical system or between any point of such a system and the earth as determined by a voltmeter.

(c) Potential of a Circuit. The potential or voltage of a circuit, machine or any piece of electrical apparatus is the potential normally existing between the conductors of such circuit or the terminals of such machine or apparatus.

(d) Where the conditions of the supply of electricity are such that the difference of potential between any two points of the circuit cannot exceed three hundred (300) volts, the supply shall be deemed a low-voltage supply.

(e) Where the conditions of the supply of electricity are such that the difference of potential between any two points of the circuit may at any time exceed three hundred (300) volts, but cannot exceed six hundred fifty (650) volts, the supply shall be deemed a medium-voltage supply.

(f) Where the conditions of the supply of electricity are such that the difference of potential between any two points of the circuit may at any time exceed six hundred fifty (650) volts, the supply shall be deemed a high-voltage supply.

(g) Grounding. Grounding any part of an electrical system shall consist in so connecting such part to the earth that there shall be no material difference of potential between such part and the earth.

(h) The term "carrying capacity" shall be taken to mean carrying capacity of a given wire as prescribed for various insulated wires in the National Electrical Code, published by the National Board of Fire Underwriters, and the United States Bureau of Mines standards for bare wires.

Care of Equipment and Practices

(a) No person shall, without authority, install or handle electric wires, lights, conductors, or electrical apparatus of any kind, or enter an electrical machine room.

(b) No person shall be allowed to work on or with electrically-driven apparatus, unless he shall have been previously instructed in the performance of his duties by a competent person and shall have been duly authorized by the quarry superintendent or quarry foreman.

(c) Instruction for the disengaging of persons from contact with live wires and the resuscitation of persons suffering from electric shock shall be posted in every generating station and substation. All employees working with electrical appartus shall be required by the quarry superintendent to familiarize themselves with these instructions, and shall be capable of applying them before entering upon such work.

Grounding

The frames and bed plates of generators, transformers, compensators, rheostats, and motors, shall be effectively grounded. All metallic coverings, armoring of cables, other than trailing cables, and the neutral wire of three-wire systems shall also be grounded.

Switchboards

Switchboards shall consist of a substantial framework of iron pipes, angles irons, or bar iron, on which shall be mounted a panel or panels of incombustible, non-absorbent insulating material that is mechanically strong and has insulating qualities suitable for the voltage at which it is used.

The panels of insulating material may be omitted if each piece of equipment carried on the switchboard is provided with an individual base of insulating material of the character specified for the panels and of adequate dimensions, or has its current-carrying parts mounted on similar insulation self-contained in the equipment, which shall be especially designed for mounting on iron pipe, angle-iron, or bar-iron frameworks.

Danger Signals

All medium and high voltage machines and apparatus shall be conspicuously marked by the use of the word "danger."

Overhead Lines

Overhead transmission lines between the generating station or substation and the quarry entrance, shall be supported upon insulators, which shall be adequate in quality, size and design for the voltage transmitted. Where such line is more than five hundred (500) feet in length, lightning arresters shall be installed in connection therewith at the entrance to the quarry. Such line, except in the case of trolley wires, shall be maintained not less than fourteen (14) feet above the ground at the lowest point.

Branch Circuits

Every branch circuit shall be provided with a switch of ample carrying capacity, on each phase, within fifty (50) feet of the point where it leaves the main circuit.

Lighting Circuits

Wires for all lighting circuits shall be covered with an insulation adequate for the voltage of the circuit, and, unless encased in pipes or other metallic covering, shall be strung on porcelain or glass insulators. Separate uncased wires shall be kept at least three (3) inches apart, except where they enter the fittings. Metallic casings, if used, shall be efficiently grounded.

Cables Entering Fittings

(a) The exposed ends of cables where they enter fittings of any description shall be so protected and finished off that moisture cannot enter the cable, or the insulating material leak out if of an oily or viscous nature.

(b) Where unarmored cables or wires pass through metal frames or into boxes or motor casings the holes shall be substantially lined with insulated bushings.

Joints in Conductors

All joints in conductors shall be mechanically and electrically efficient and shall be soldered wherever necessary. All joints in insulated wire shall, after the joint is complete, be re-insulated to the same extent as the remainder of the wire.

Joints in Cables

Where cables are joined, suitable junction boxes shall be used or the joints shall be soldered, and the insulation, armoring, or leading covering replaced in as good condition as it was originally.

Fuses, Circuit Breakers and Switches

(a) Fuses and automatic circuit breakers shall be constructed so as effectually to interrupt the current when a short circuit occurs or when the current through them exceeds a predetermined value. No open type or link fuses shall be used.

(b) All points at which a circuit has to be made or broken shall be provided with proper switches, which shall be so installed that they cannot be closed by gravity.

(c) Fuses shall be stamped or marked, or shall have a label attached, indicating the maximum current that they are intended to carry. Fuses shall be adjusted or replaced only by an authorized and competent person.

(d) The capacity of fuses used to protect feeders shall not exceed the current capacity of the feeder by more than twenty-five (25) per cent.

(e) All switches, circuit breakers and fuses shall have non-combustible bases.

Stationary Motors

Every stationary motor and every portable motor, together with its starting device, shall be protected by a fuse on each phase or (in the case of motors of more than forty (40) horse power) by a circuit-breaking device on at least one phase of

direct-current motors and on each phase of alternating-current motors, and by switches arranged to cut off entirely the power from the motor. The above devices shall be installed in a convenient position near the motor and in sight of it.

Electric Lighting

(a) Lamp Sockets. The exterior of the sockets of all fixed incandescent lamps, installed after these rules go into effect, shall be entirely non-metallic.

(b) Flexible Lamp Cord. The use of flexible lamp cord for lighting connections is prohibited, except for portable incandescent lights to be used in connection with the inspection and repair of machinery and equipment, and in that case the cord shall have extra heavy insulation. Such portable lights shall be protected by a wire cage large enough to inclose both lamp and socket and shall be provided with a handle to which the light and socket shall be firmly attached and through which the leading-in wires shall be carried.

(c) Incandescent Lamps. Incandescent lamps shall be so placed that they cannot come into contact with combustible material, and shall be so placed that an adequate circulation of air may take place on all sides of them.

Duties of Employees

Every employee shall be responsible for carrying out all rules which immediately concern or affect his conduct.

Some of the Vast Building Projects of Uncle Sam

MORE than 100 housing projects have been taken up by the various Government agencies so far, and the result of the work must be to exercise an important salutary influence upon the housing problem throughout the country. Uncle Sam has not only undertaken war upon an unprecedented scale, but, in the midst of the almost unlimited energy demanded by the war he has found time, so to speak, to lift himself up by the bootstraps over some critical and annoying pre-war conditions, says the Record and Guide.

The history of each of these Government projects is a fascinating story in itself. However, but few can be mentioned here, just enough to show that not all of the money Uncle Sam is raising is being destroyed in the waging of war, but that much of it is being put into splendid investment. Following are descriptions of some of the past projects:

Nitro

Nitro, near Charleston, W. Va., is a wooden city of 1,700 bungalows and many dormitories, bunkhouses and the like, planned and created on vacant land by a single builder, Thompson-Starrett Company, for the Hercules Powder Corporation. September finds it complete and crowded. The bungalows are ready cut construction and can be taken down and sold when the war ends.

The highest grade village is at Perryville, Md. It catches the eye from the Pennsylvania Railroad trains crossing the Susquehanna—a pleasant town of white cottages with green roofs. These houses have three or four bedrooms, 11 by 18, and spacious porches. Only a few types are used, but monotony is avoided by adroit spotting and a good street plan.

Neville Island

In the future is one town that deserves special mention—Neville Island—for there lies the greatest chance of all. Neville Island is a long bar in the Ohio River, two miles below the city limits of Pittsburgh, where the United States Steel Corporation is building for the Government a great permanent cannon and shell plant at a cost of $140,000,000. It will employ upward of 12,000 men—possibly 25,000. The region is already congested and a great housing development is indicated on an admirable site of farm land on the southern shore.

The land is 400 ft. above the river, broken by ravines, and from a low bridge across the shallow and unnavigable branch of the river a roadway will lead a mile up to the town through one of these wooded ravines, following a brook which at one point could make a small lake. From the head of this ravine the plateau spreads like a four-leaf clover between other ravines, which would naturally be parks. The $7,000,000 which is reserved for this project is only a starter. At least $20,000,000 more will be required from later appropriations, and a new city of at least 5,000 dwellings—25,000 people—seems certain to be put there before the end of 1919.

At Niagara Falls

The U. S. Government, through the Bureau of Industrial Housing, of which Otto M. Eidlitz is director, is planning a housing development at Niagara Falls, N. Y., which will involve an expenditure of about $6,000,000. Plans for the project which call for the erection of 152 houses, 2 stories in height of brick and stucco material, have been prepared by Dean & Dean, 137 S. LaSalle-st, Chicago, Ill.

The town layout has been designed by John Nolan, Cambridge, Mass., Town planter. Walter McCullough, 407 Gluck building, Niagara Falls, is the engineer. The general contract has been awarded to the George W. Stiles Construction Co., 11 So. LaSalle-st, Chicago, Ill.

Mariner's Harbor

Another interesting housing development is planned by the United States Government at Mariner's Harbor, Staten Island, the contract for which has just been awarded to Bing & Bing, 119 West 40th-st. Plans for the project, which will cost about $400,000, have been prepared by Delano & Aldrich and Charles H. Higgins, 126 E. 38th-st, Manhattan; A. D. Brinkerhoff, 527 Fifth-av, town planner, and Pollock & Tabor, 113 Park Row, engineers.

The buildings will be used for the housing of employees in the various shipbuilding yards. The plans called for 18 double houses with accommodations of 6 rooms and bath for 36 families; 18 double houses containing accommodations for a similar number of families, but arranged in suits of 5 rooms and bath and an additional apartment house to house 30 families.

A hundred houses in a single month for employees of shipyards is the job undertaken by a construction company of Portland, Ore., on a contract with the United States Government. The individual houses are to be sold to the company's employees virtually at cost and on easy payments.

Haste Required

Urgent necessity for these homes was responsible for the agreement of the company to start construction upon all of them at once, and to finish them all within the given time. They will be built entirely of wood.

Wood is being transformed into a house every sixteen minutes, according to the statement recently issued by a lumber and supply concern of Huntington, W. Va., having a contract with the Government. This company has been building these houses at that rate of speed for the Government for many months, and in these little portable, standardized, knock-down and set-up houses the war work of Uncle Sam is being conducted from the farthest line to within sight of the shell craters.

Potash Is Discovered in Catalonia

DUTCH journals state that deposits of potash have been discovered in Catalonia, and will probably be mined in the Netherlands, in addition to output which may be developed in the United States. Owing to enormous sums invested, high prices for potash are vitally essential to German producers, who charge foreign customers more for their product than is asked from domestic consumers.

War Decreases Production of Granite Paving Blocks

Quarry Industry Curtailed by Delayed Pavement Construction but Increasing Use of Heavy Trucks Gives Bright Outlook for Future of the Industry

GRANITE paving blocks valued at $2,303,767, and numbering 30,978,305 were sold in 1917, according to a statement compiled under the direction of G. F. Loughlin, U. S. Geological Survey, Department of the Interior, in co-operation with the Granite Paving Block Manufacturers' Association of the United States (Inc.), and the Geological Surveys of Georgia, Maryland, Minnesota, Missouri, New York, North Carolina, Pennsylvania, Virginia and Wisconsin. The quantity of paving blocks produced represents a decrease of 13 per cent compared with 1916, which in turn showed a decrease of more than 4 per cent compared with 1915.

The value in 1917, however, owing to increase in price, was only 1 per cent less than that in 1916, which was practically the same as that of 1915. The average price per thousand during each of these three years was $48.85 in 1915, $50.73 in 1916, and $57.63 in 1917, the last being the highest price ever recorded. These figures do not include sales of "durax" blocks (3 and 4-in. cubes).

Sales in 18 States

Sales were reported from 18 states in both 1916 and 1917, South Carolina replacing Delaware in 1917. Three states, Connecticut, Massachusetts and Vermont, showed increase in quantity in 1917. Maine showed a decrease of only 1 per cent. The largest decreases were in California (90 per cent), Georgia (50 per cent), Rhode Island (64 per cent), and Virginia (44 per cent).

The average price per thousand ranged from as low as $33 in Vermont and $44 in New Hampshire to $69 in Minnesota and $67 in Rhode Island. New Hampshire and Vermont showed decreases in average price per thousand of $1 and $3, respectively, in 1917. Virginia's average price remained the same as in 1916.

States with Increases

The other states showed increases ranging from $1 in Rhode Island to $16 in California and Maine and $14 in Georgia. Notwithstanding the considerable increase in the average price in Georgia, the principal controlling factor in 1917 as in 1916 was apparently the ease with which the blocks could be prepared. Thus the average price in New Hampshire ($44) and in Georgia ($47), where easily worked granite blocks are abundantly produced, presented a contrast to that in Massachusetts ($58), where some of the granites are unusually hard, and with the average price in Wisconsin ($64) and in Minnesota ($69), where the granites are hard.

This review shows that the decline in the sales of granite paving blocks in the eastern half of the country, which includes the principal markets, was due to temporary conditions caused by the war, which curtailed a normally increasing demand. Even in New England, where there was a slight increase in quantity, the conditions as a whole were below normal.

War Travel Wearing Out Roads

In many cities, however, particularly in the Atlantic States, the increase in heavy traffic resulting from the war will necessitate the upkeep of granite-paved streets and the repaving with granite of streets on which other pavements have hitherto been adequate. Properly paved streets in districts of heavy freight traffic are a war necessity, and therefore a reasonable demand for granite paving blocks should exist.

Producers in 1917 reported for the first time the cities to which their output was shipped. The quantity shipped to each city was not stated, but the data supplied gives a good general idea of the distribution of the output in 1917. New York, Philadelphia, and Chicago were the leading cities, each with a probable consumption of more than 3,000,000 blocks. Newark, N. J., and perhaps Boston and Cleveland also consumed approximately 2,000,000 blocks each. Milwaukee, Brooklyn, Detroit, St. Louis and Akron, Ohio, may each have consumed 1,000,000 or more blocks.

Cities Large Consumers

Cities that may have consumed 500,000 blocks or more are Worcester, Mass.; Jersey City and Elizabeth, N. J.; Yonkers and Albany, N. Y.; East St. Louis, Ill.; Minneapolis and St. Paul (together), Minn., and Kansas City, Mo. Cities in Massachusetts, excluding Boston and Worcester, probably consumed together between 2,500,000 and 3,000,000 blocks, and cities in New Jersey not mentioned above consumed 1,000,000 or more blocks.

Georgia, Pennsylvania (excluding Philadelphia), Rhode Island and Virginia were probably next in order and were followed by New York, Ohio, and Indiana, while small quantities (probably less than 250,000 blocks) were consumed in Kentucky, Connecticut, Vermont, New Hampshire, Maine, Tennessee, and North Carolina.

As already noted the demands of the war are likely to require the repaving of streets to withstand heavier traffic than formerly. Where the traffic is not so extremely heavy as to require the large block, the durax block may serve the purpose excellently. In the Atlantic and Gulf Coastal Plain region, where military highways may be constructed, where road materials adequate for withstanding frequent heavy traffic are very scarce, and where suitable materials must be shipped in from considerable distances, durax paving is worthy of careful consideration.

Private Building May Be Resumed by January

NEW YORK—Official acts and intimations at Washington in the last few days (Since Nov. 1) make the assurance practically certain that the building industries of the country should be far advanced toward the new era awaiting them, by the first of the year, says The Dow Service Building Reports.

Charles Piez, vice-president and general manager of the United States Shipping Board Emergency Fleet Corporation has sent this telegram to a number of ship building plants throughout the country from his headquarters in Philadelphia:

"By direction of the Board of Trustees your contract No. — for the construction of (number of ships under order) is hereby cancelled. Stop work on all commitment made by you and make no further expenditures under this contract. Supply us with following information at once: First, money actually spent since release of your contract for plant, classified as to real estate, equipment, plant improvements, including labor. Second, commitment made since release of your contract for plant, same classification. Third, itemized statement of total disbursement commitments made on barge construction."

Coupled with the issuance of these orders through which it is expected large quantities of materials will be made subject to redistribution thereby relieving the pressure on steel and other commodities entering into the construction of new buildings as well as ships, the intimation was made that more latitude would result for the applicants desiring to proceed with construction work of important character.

Practically no decisions will be made until after the Washington conference.

NEW MACHINERY AND EQUIPMENT

New Model Trucks With Double Reduction Drive

NEW MODELS of three and five-ton motor trucks having, among other improvements, a double reduction gear drive, have been announced by The White Company, Cleveland, Ohio.

The new design of rear axle, doing away with side driving chains, is of especial interest to truck users because it is claimed that in addition to showing the solution of an important engineering problem, the design retains the advantages of chain drive and adds advantages of its own which produce greater efficiency.

In announcing the double reduction gear drive, the company states: "The chain and sprocket afforded in a heavy duty truck a double reduction system—one reduction in a jackshaft and a second reduction in the chain and sprocket wheels—thus giving a large range of gear ratios and, consequently, a greater flexibility than can be had in any single reduction shaft drive unless the gear housing is made very large and the rear axle, in consequence, heavy and unwieldy. Chain drive also has this advantage: power is applied to the rear wheels on a sprocket attached to them; power is thus applied nearer to the wheel rim and by a rolling contact between the chain and sprocket.

"The new double reduction gear drive accomplishes the same result. There is a first reduction through the bevel gear and drive pinion in the center of the rear axle, from which the power is carried by a live axle of the floating type through the center of the housing to a gear at the wheel end of the live axle. This gear, in turn, meshes with a second gear (carried on the housing of the live axle, but inside the hub case of the rear wheel), and this second gear, in turn, meshes with a ring gear attached to the wheel inside of the hub case.

"In this way of applying power to the wheel, a second reduction occurs between these three gears in the hub case very similar to the reduction which takes place between the sprocket wheels of a chain drive. The power is applied at about the same distance from the rim as it is in the case of the chain drive, thereby retaining that advantage. This use of gears makes a rolling contact throughout, without any elements to produce friction.

"The adoption of the floating type of rear axle and the train of gears in the hub case of the wheel, enables the whole mechanism to be entirely encased and run in oil. The result is a comparatively frictionless running axle that cannot be cramped or get out of line, and has all of the operating advantages of chain drive with the added advantage in point of maintenance of being enclosed in a dust-proof case and running in oil.

"Chain drive had a further advantage over other types of rear axles in the fact that its upsprung weight was considerably less. The new double reduction rear axle has the same advantage in that the unsprung weight of the truck has not been increased but, in fact, decreased a little. The result will be at once apparent in the life of tires."

Engine improvements in the new trucks consist of a unit power plant which is a development of the monobloc design always used in White trucks. The company has improved its operation by employing a greater valve capacity, a balanced crank shaft and a pressure feed lubrication system—features which it is claimed have shown high efficiency in heavy duty service of greater severity.

Through the adoption of the double reduction gear drive, the company has been enabled to also improve the design of the brakes. The service brake is of the contracting type, operated by foot pedal and acting on drums on the drive shaft. The brake is mounted amidships, on a cross member of the frame, where it is more accessible and where a larger braking surface can be used, applying a greater braking resistance and insuring a longer life. The emergency brake, operated by hand lever, is of the expanding type, acting on drums on the rear wheels, completely enclosed and designed with a simple external adjustment.

New truck with double reduction gear drive in which the makers claim the advantages of the chain drive are attained

Offers Cost Record Forms to Truck Owners

THE FEDERAL MOTOR TRUCK CO. will furnish free to any truck owner who requests them, record forms and advice as to the best method of using them in ascertaining what his truck or trucks is doing and costing day by day.

Use of such forms, according to M. L. Pulcher, general manager of the company, should result in conservation of gasoline, add to the life of the truck, and increase its working capacity.

On these forms, records are made of every item of cost and then listed under one of two heads—fixed charged and variable charges. The fixed charges are labor, interest on investment, insurance, garage rent and taxes and license and will be the same each day regardless of work done. The variable changes are fuel, lubricants, tires, maintenance and depreciation.

Records of truck operation and costs will show two facts—first, the greater the daily mileage, the greater will be the proportion of variable charges to the whole. Variable charges increase in direct proportion to the mileage traveled.

Second, the greater the daily mileage, the less burdensome will be the fixed charges. Fixed charges decrease in proportion to the mileage traveled.

The Rock Products Market

Agricultural Limestone Wholesale at Plant, per Ton

EASTERN

Coldwater, near Rochester, N. Y.—(80% thru 100 mesh) Analysis, $CaCo_3$, 56.77%; $MgCo_3$, 41.74%.... 2.25@2.65

Danbury, Conn.—(50% thru 100) Analysis, $CaCo_3$, 96%; $MgCo_3$, 2%; ppr., $4.00; bulk..... 2.75

Hillsville, Pa.—(90% thru 100 mesh) in 80 lb. ppr. bags, $4.50; bulk..... 3.00

Jamestown, N. Y.—(90% thru 100 mesh)—Bags 2.50

Pownal, Vt. (50% thru 100) Analysis, $CaCo_3$, 96%; $MgCo_3$, 2%; ppr., $4.00; bulk 2.75

Walford, Pa.—(70% thru 100; 50% thru 50; 100% thru 10; 50% thru 4) Paper, $4.50; bulk..... 3.00

West Stockbridge, Mass. — (50% thru 100) Analysis, $CaCo_3$, 96%; $MgCo_3$, 2%; ppr., $4.00; bulk..... 2.75

CENTRAL:

Alton, Ill.—(Pulv. and 90% thru 50 mesh; 90% thru 4 mesh) Analysis, $CaCo_3$, 96%; $MgCo_3$, 75%..... 2.00

Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, 98.5%; $MgCo_3$, 0.5% 1.75

Columbia, Ill., near East St. Louis —(⅛" down) ..... 1.25@1.80

Elmhurst, Ill. — Analysis, $CaCo_3$, 29.43%; $MgCo_3$, 20.69%..... 1.00

Greencastle, Ind. — (50% thru 50 mesh) Analysis $CaCo_3$, 98%..... 1.75

Illinois, Southern—(50% thru 50 mesh) Analysis, $CaCo_3$; 96.12%; $MgCo_3$ 2.10%..... .....

Lannon, Wis.—(50% thru 50 mesh) Analysis, 53.35%, $CaCo_3$; 43.27% $MgCo_3$ 2.00

Marble Cliff, O.—(50% thru 100 mesh) Analysis, $CaCo_3$, 86%; $MgCo_3$, 8%..... 3.00

Marblehead, O.—(50% thru 100 mesh; 60% thru 50 mesh; 100% thru 10 mesh)—Analysis (Min.), $CaCo_3$, 32.03%; $MgCo_3$ 3.75%. Bulk, $3.00; ppr. 80 lb. sack..... 4.50

McCook, Ill.—(90% thru 4 mesh)... .75@1.00

McCook, Ill.—(100% thru ¼" sieve; 78:12% thru No. 10; 53:29% thru No. 20; 38:14% thru No. 30; 26:04% thru No. 50; 16:27% thru No. 100) Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04%..... 1.00@1.25

Montrose, Ia.—(90% thru 100 mesh) 1.25@1.50

Muskegon, Mich.—(50% thru 50 mesh) Analysis, $CaCo_3$, 53.35%; $MgCo_3$, 43.27%..... 1.50@2.00

North Industry, O.—(50% thru 100 mesh; and pulverized limestone) Analysis, $CaCo_3$, 91%; $MgCo_3$, 1.63% 3.00

Piqua, O.—(50% thru 100 mesh).... 2.50@4.00

Rockford, Ill.—Analysis, $CaCo_3$, 53.75%; $MgCo_3$, 44.35%..... 1.25

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ⅛" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82%..... 1.50

Stone City, Ia.—50% thru 100 mesh) .50

SOUTHERN:

Atlanta, Ga.—(100% thru 10 mesh—all dust contained) combined carbonates, 98%..... 3.00

Brooksville, Fla.—Pulverized limestone 1.80

Fletcher, N. C.—(100% thru 10 mesh) Analysis, $CaCo_3$, 90%; $MgCo_3$, 80%. Paper, $3.75; bulk.. 2.25

Keystone, Ala.—(90% thru 50 mesh) Analysis, $CaCo_3$, 99.50%; $MgCo_3$, none 1.25

(Continued on next page.)

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo	One dollar per net ton, all sizes					
Burlington, Vt.	.....	.....	2.50	1.75	1.75	.....
Coldwater, nr. Rochester, N. Y.	Flux, 1.50@2.10					
Grove, Md.	1.50	2.10	2.00	1.95	1.75	1.40
Hagerstown, Md.	$2.00 for all sizes					
Hillsville, Pa.	.90 for all sizes					
North Leroy and Akron, N. Y.	$1.00 for all sizes, including R. R. ballast					
Quarryville, Pa.	.....	.....	.....	2.00	(local trade only)	
Rock Cut, N. Y.	.80	1.20	1.20	1.20	1.20	1.20
Walford, Pa.	All sizes 1.35					
CENTRAL:						
Alton, Ill.	1.85	.....	1.45	1.35	.....	.....
Belvidere, Ill.	1.00 for all sizes					
Cincinnati, Ohio	Various sizes $1.75 per net ton					
Cleveland, Ohio	Various sizes $1.90 per net ton					
Columbia, Ill. (near E. St. L.)	1.25@1.80	.85@1.20	.95@1.30	.95@1.30	.80@1.20	.....
Detroit, Mich.	Various sizes $1.50 per net ton					
Dundas, Ont.	.65	1.10	1.10	1.10	.90	.90
Eden and Knowles, Wis.	.80	.80	1.00	1.00	1.00	1.00
Elmhurst, Ill.	1.00	1.00	1.00	1.00	1.00	.90@1.00
Ft. Wayne, Ind.	Various sizes $1.60 per net ton					
Gary, Ill.	1.05	1.05	1.05	1.05	.80‖	.80‖
Hull, Canada	1.20	1.20	1.20	1.05	.80	.....
Greencastle, Ind.	1.00@1.25	1.10	1.00	.90@ .95	.90	.90
Illinois, Southern	1.25	1.25	1.25	1.25	1.25	.90
Lannon, Wis.	1.00 all sizes					
Lima, Ohio	1.00	1.10 for all other sizes				
Linwood, Scott Co., Ia.	.50	.....	1.13	1.05	1.13	.....
Mayville, Wis.	.70@ .75	.70@ .75	1.10	1.10	1.10	1.10
Oshkosh, Wis.	1.00 in all sizes, Blue Limestone					
Ottawa, Can.	1.90	2.00	2.00	1.75	1.50	.....
River Rouge, Mich.	.60@1.00	.95@1.00	.95@1.00	.95@1.00	.95@1.00	.95@1.00
Rockford, Ill.	1.25	.....	.....	1.25	1.25	1.25
Saginaw, Mich.	.95	.95	.95	1.05	.95	.95
Sheboygan, Wis.	80@1.00 for all sizes					
Stone City, Ia.	.50	(1-inch 1.20)		1.10	1.00	.....
SOUTHERN:						
Atlanta, Ga.—Dolomite	.....	2.40	2.30	2.20	2.10	.....
Brookville, Fla.	.....	.....	.....	2.50	.....	.....
Fort Springs, W. Va.	.50	1.60	1.60	1.40	1.30	1.10
Stephensburg, Ky.	Railway ballast 1.10 per cu. yd. 1.20 any size					
Winnfield, La.	1.20	1.80	1.80	1.80	1.80	1.80
WESTERN:						
Atchison, Kans.	.25	1.30	1.30	1.30	1.20	1.20
Blue Sprgs. & Wymore, Neb.	Rip-Rap @ 1.00 (Florence flint imbedded in limestone)					
Carthage, Mo.	.15	1.35	1.35	1.25	1.15	1.10
El Paso, Tex.	1.50	1.50	1.25	1.25	1.25	1.25
Kansas City, Mo.	.90 for all sizes					
	.60	1.35	1.35	1.35	1.35	1.35

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md. (vicinity)—	1.50	3.25	2.85	2.75	2.25	.....
Birdsboro, Pa.	1.25	1.75	1.50	1.25	1.25	1.25
Duluth, Minn.—Trap	.65@ .75	1.35@1.50	1.25@1.35	1.15@1.25	1.15@1.25	.....
Farmington, Conn.	.70	.85	.85	.80	.....	.....
Glen Mills and Rock Hill, Pa. —Trap	1.10	1.40	1.60	1.60	1.60	1.40
	R. R. ballast 1.40					
Little Rock, Ark.—Trap	.....	1.75	.....	1.75	1.50	1.35
Millington, N. J.	1.75	1.85	1.75	1.75	1.60	.....
Montrose, Ia.—Trap	.....	1.10@1.20	1.10@1.25	1.05@1.10	1.00@1.10	.....
Morristown, N. J.—Trap	1.85	1.75	1.75	1.60	1.40	1.40
New Britain, Conn.	.75	1.30	1.25	1.20	1.10	.....
North Branford, Conn.—Trap.	.80	1.30	1.25	1.20	1.10	.....
Oakland, Cal.	1.90	1.90	1.75	1.75	1.75	.....
Richmond, Cal.—Trap	.....	.....	1.75	1.65	1.65	.....
Stephensburg, Ky.	1.26 per cu. yd. for any size produced					
Westfield, Mass.—Trap	.60	1.00	1.10	1.00	.90	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Brooksville, Fla.—Flint	1.00	.....	.....	2.25	.....	.....
Fair Oaks, Calif.—Cr. Bldrs.	.85	1.05	.95	.85	.85	.....
Hendlers, Pa.—Quartzite	.75	1.00	1.35	1.25	1.60	1.00‖
Little Falls, N. Y.—Syenite	.60	Other sizes 1.00, including R. R. ballast				
Richmond, Va.—Granite	1.25	1.50	1.50	1.50	1.50	1.50
Stephensburg, Ky.	1.26 per cu. yd. any size Basalt and other kinds					
Stockbridge, Ga.—Granite	.50	2.10	2.10	2.00	2.00	1.95
Webb City, Mo.—Flint	.60	.35	1.25	1.25	1.25	1.25

*Cubic yard. †Agri. lime. ‖R. R. ballast. §Flux. ‡Rip-rap.

Agricultural Limestone Wholesale at Plant per Ton

(Continued from preceding page.)

Knoxville, Tenn.—Analysis: $CaCo_3$, 52%; $MgCo_3$, 38%—
90% thru 100 mesh..... 3.50
50% thru 50 mesh..... 2.00
Stephensburg, Ky.—Analysis, $CaCo_3$, 98% 1.20
Winnfield, La.—(50% thru 50 mesh) 3.00

WESTERN

Cement, Cal.—(50% thru 100 mesh) 4.00
Elsberry, Mo.—(Pulverized) Analysis,, $CaCo_3$, 99.29%..... 1.85@1.95
Fresno, Cal.—(All thru 40 mesh) Analysis, $CaCo_3$, 98%; $MgCo_3$, 1%. (50% and 40% thru 200 mesh) sacked, $5.50; bulk, $5.00. (100% thru 40 mesh) sacked, $5.25; bulk 4.75
Bulk 1.50
Kansas City, Mo.—(50% thru 100 mesh) 1.50

Current Wholesale Prices in New York

CURRENT wholesale prices, prevailing on the Building Material Exchange and elsewhere in the Metropolitan district in New York, are given as below in the Record and Guide. Allowances must be made for yard and store prices:

Cement (wholesale, 1,000 bbls. lots and over, alongside dock, N. Y.):
Domestic Portland, Spot.....3.20@——
Rebate on bags, returned, 25c bag.
Rosendale Natural to dealers, wood or duck bags.....——@——
Rebate on bags, returned, 10c bag.
Gravel (500 cu. yd. lots f. o. b. alongside dock N. Y., wholesale):
1½ in. (nominal).....$2.00@——
Other sizes, no quotations.
Sand—
Screened and washed Cow Bay. 500 cu. yds. lots, wholesale..$1.25@——
Buff Mountain, per cu. ft..... 1.50

(Continued on page 39)

Miscellaneous Sands per Ton at Plant

GLASS SAND

Bowmanstown, Pa.—Glass sand... 2.00@2.50
Cedarville, N. J.—Glass..... 1.50@4.00
Hellam, Pa.—Glass..... 2.00
Dundee, Ohio—Glass..... 2.00@2.25
Kermit, Va.—Glass sand:
Washed ..... 2.25@2.75
Crushed ..... 1.75@2.00
No. 2..... 1.00@1.25
Mapleton, Pa.—Glass, damp..... 3.00
Glass, dry..... 3.50
Massillon, Ohio—Glass..... 2.00
Michigan City, Ind.—Glass sand.... .40
Mineral Ridge, O.—Glass..... 1.75@2.75
Montreal, Can.—Glass..... 4.50
Montoursville, Pa.—Glass..... 1.25@2.00
Ottawa, Ill.—Crystal Silica..... 2.50
St. Mary's, Pa.—Glass sand—Green, $2.50; washed 3.00
Sands, Elk Co., Pa.—Glass sand, $2.50; selected glass sand..... 3.00
South Vineland and Cedarville, N. J.—Glass 2.00
Sugar Grove, Ohio—Glass..... 2.00@2.25
Thayer, W. Va.—Glass..... 2.75@3.25

MOLDING SAND

Albany, N. Y.—Moulding..... 1.50@2.00
Allentown, Pa.—Moulding..... 1.40@1.50
Bowmanstown, Pa.—Moulding 1.50
Cleveland, O.—Moulding..... 1.25@1.75
Cleveland, O.—Core, at pit..... .33@ .75
Mapleton, Pa.—Molding, damp..... 3.00
Molding, dry..... 3.50
Michigan City, Ind.—Core..... .30
New Lexington, Stamden and Layland, Ohio—Moulding..... 2.00@2.25
West Albany, N. Y.—Moulding..... 2.00@5.00
Zanesville, O.—Moulding..... 2.00@2.25

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Bowmanstown, Pa.	.....	1.20	1.10	.....	.....	.....
Buffalo, N. Y.	1.25 cu. yd., all sizes					
Buffalo, N. Y. (Niagara River)	.80	.75	.70	.70	.70	.70
Libby's Pit, Leeds Junct, Me.	1.00	.50@ .60	1.50	.....	1.35	1.25
Morristown, N. J.	.....	.50@ .55	.95@1.00	.95@1.00	.95@1.00	.....
No. Wilbraham, Mass.	.....	.50*	1.75*	.....	1.20*	1.05*
Washington, D. C. (wharves)	.....	.75	.....	.....	1.20	1.20
CENTRAL:						
Algonquin, Ill.	All grades .50 per cu. yd. (3,000 lbs.)					
Barton, Wis.	.75	.70	1.00	.70	.70	.70
Bay City-Saginaw, Mich. (On cars)	1.00	1.00	1.95	1.70	1.70	1.50
Beloit, Wis.	.40	.40	.50	.40	.40	.40
Chicago, Ill.	.....	1.00	1.00	1.00	1.00	.....
Cincinnati, Ohio	.40@ .50	.40@ .50	.40@ .50	.50@ .60	.50@ .60	.50@ .60
Columbus, O.	.....	.60	.50	.60	.60	.60
Des Moines, Ia.	40@ .75	.50	1.25@1.50	1.25@1.50	1.00@1.25	1.00@1.25
Des Moines, Ia.	.30@ .40	.30@ .40	.....	.....	1.00@1.25	1.00@1.25
Elgin, Ill.	.....	.50	.50	.50	50	.50
Escanaba, Mich.	.85	.85	1.20	1.20	.85	.85
Fort Dodge, Ia.	1.00	.90	1.50	.....	1.50	1.50
Hawarden, Ia.	.40@ .60	.40@ .60	.....	.95@1.25	.....	.85@1.00
Greenville and Mechanicsburg, O.	.50	.50	.50	.60	.60	.60
Illinois, Northern	.60@ .70	.70	.70@ .80	.70@ .80	.60@ .70	.50@ .60
Indianapolis, Ind.	.50	.50	.....	.65	.65	.65
Janesville, Wis.	.....	.28@ .55	.....	.....	.28@ .55	.....
Kalamazoo, Mich.	.50@ 60	.50@ 60	.50@ .70	.60@ .80	.60@ .80	.60@ .80
Keithsburg, Ill.	.....	.60@ .70	.....	.65@ .80	.....	.....
Mason City, Ia.	.60	.50	1.10@1.20	1.20	1.00@1.20	1.00@1.20
	Railway ballast and road work, .40					
Milford, Ind.	.....	.60	.....	.....	.70	.....
Milwaukee, Wis.	1.06 for all sizes					
Minneapolis, Minn.	.50* 2800 lbs.	.50* 2800 lbs.	1.25* 2600 lbs.	1.20* 2600 lbs.	1.15* 2600 lbs.	1.10* 2600 lbs.
Montezuma, Covington, Ind.	.75	.75	.75@ .85	.75	.75	.75
Niles, Mich.	.....	.50@ .80	.60@ .85	.50@ .80	.50@ .80	.50@ .80
Sabula, Ia.	.40@ .60	.40@ .60	1.00	1.00	1.00	1.00
St. Paul, Minn.	.65*	.65*	1.75*	1.25	1.15*	1.15*
Terre Haute, Ind.	.75	.75	.75@ .85	.75	.75	.75
Wabash Valley District, Ind.	All sizes, .75.					
Winona, Minn.	.60@ .90	.60@ .90	1.00@1.40	1.00@1.40	.95@1.25	.95@1.25
Winona Lake, Ind.	.....	.85	.....	.....	.....	.....
SOUTHERN:						
Charleston, W. Va. (River)	1.20	1.20	1.30	1.30	1.30	1.30
Lake Weir, Fla.	.....	.50	.....	.....	.....	.....
Knoxville, Tenn.	.85@ .90	.85@ .90	1.00@1.50	1.00@1.50	.95@1.40	.95@1.40
New Orleans, La.	1.70*	(2500 lbs.)	2.50*	(2700 lbs.)	.....	.....
Pelzer, S. C.	All sizes, .55 per net ton					
Valde Rouge, La.	.....	.75*@1.00*	2.10*	2.00*	1.50*	1.25*
Waco, Tex.	.75	.75	1.20	1.20	1.00	1.00
WESTERN:						
Joplin, Mo.	.60	.60	.40	.....	.....	.....
Kansas City, Mo.	Car lots, building sand, @ .60; retail truck 1.50*					
Lincoln, Neb. (Pit)	.75	.75	1.80	1.80	1.80	1.60
Pueblo, Colo.	.80	.60	.....	.....	1.50	.....
Roche Spur, Tulare Co., Cal.	.35 River sand ¼ inch					
San Francisco, Cal.	1.15 for all grades					
Seattle, Wash.	.....	1.00*	1.75*	1.00*	1.00*	1.00*
Vancouver, B. C. (Scows)	.....	1.45*	1.70*	1.65*	1.65*	1.45*

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.45	.45	.....	.60	.60	.60
Burnside, Sand Pit, Conn.	All sand, .80 cu. yd.					
Bushnell's Basin, N. Y. (near Rochester)	All sizes, .40@ .50					
Forestport, N. Y.	1.00	1.00	.....	.....	.....	.....
Lowell Junction, Mass.	.....	.50*@ .75*	.....	.....	.....	1.25*
Pittsford, N. Y.	.....	.50	.....	.....	.....	.....
Yardville, N. J.	.....	.50 @ .75	.....	.....	.....	.....
York, Pa.	.....	1.00@1.10	.....	.....	.....	.....
CENTRAL:						
Attica, Ind.	.75					
Bay City-Saginaw, Mich. (On cars)	1.00	1.00	1.20	1.20	1.20	1.20
Cleveland O.	1.00@1.75 bank sand					
Des Moines, Ia.	Concrete mix washed at .60 per ton					
Escanaba, Mich.	.....	.50*	.....	.....	.....	1.00
Indianapolis, Ind.	Concrete mix .55					
Janesville, Wis.	.....	.....	.....	.....	.28@ .55	.....
Keithsburg, Ill.	.....	.40@ .60	.....	.....	.....	.....
Milford, Ind.	.....	.....	.....	.....	.50	.....
Montezuma, Covington, Ind.	.....	.....	.....	.....	.60	.60
Portsmouth, Ohio.	.....	.65	.....	.85	.....	.....
Sabula, Ia.	.....	.....	.....	.....	.....	.50@ .70
Saginaw, Mich. (on cars)	1.20	1.20	1.80	1.80	1.80	1.80
Terre Haute, Montezuma, Ind.	.60 unscreened					
Toledo, O.	.....	.....	.....	.....	.....	.55@1.00
Wabash Valley District, Ind.	.75 for all sizes					
Winona, Minn.	Pit run gravel under 2-in., .60@.90					
SOUTHERN:						
Howcott, La.	50% and up in rock content over ⅛" screen, .65					
Joplin, Mo.	.75	.60	.40	.....	.....	.....
Knoxville, Tenn.	.85@ .90	.....	.....	.....	.....	.....
Lindsay, Tex.	.....	.....	.44	.44	.....	.....
Valde Rouge, La.	Gravel 60% metal on ⅛" screen, .60 per ton					
WESTERN:						
Pueblo, Colo.	River Run .60 unscreened					
Vancouver, B. C.	.....	.85@1.10	.....	1.00@1.25	.....	.85@1.00

* Cubic yard. B Bank. L Lake. ‖ Ballast.

Current Wholesale Prices in New York

(Continued from page 38.)

Lime (standard 300-lb. bbls.):

Eastern common, wholesale price	$2.50@——
Eastern finishing, wholesale price	$2.70@——
Hydrated common (per ton)	15.20@——
Hydrated finishing (per ton)	17.20@——

Window Glass. Official discounts from manufacturers' lists:

Single strength, A quality, first three brackets	77%
B grade, single strength, first three brackets	77%
Grades A and B, larger than the first three brackets, single thick	77%
Double strength, A quality	79%
Double strength, B quality	81%

Plaster—(Basic prices to dealers at yard, Manhattan):

Mason's finishing in 100 lbs. bags, per ton	$23.00@——
Dry Mortar, in bags, returnable at 30c each per ton	14.05@——
Block, 2 in. (solid), per sq. ft.	$0.11
Block, 3 in. (hollow), per sq. ft.	0.11

Crushed Stone (500 cu. yd. lots, f. o. b. alongside dock N. Y., wholesale):

Trap rock, 1½ in. (nominal)	$1.85@——
Trap rock, ¾ in. (nominal)	2.00@——
Crushed limestone, 1½ in.	1.80@ 1.85
Crushed limestone, ¾ in.	1.90@ 2.00

Building Stone—

Indiana limestone, per cu. ft.	$1.28
Kentucky limestone, per cu. ft.	1.50
Brier Hill sandstone, per cu. ft.	1.50
Gray Canyon sandstone, per cu. ft.	.95
Buff Wakeman, per cu. ft.	1.50
Buff Mountain, per cu. ft.	1.50
North River bluestone, per cu. ft.	1.05
Seam face granite, per sq. ft.	1.00
S. Dover marble (promiscuous mill blocks, per cu. ft.	2.25
White Vermont marble (sawed), New York, per cu. ft.	3.00

Why Builders Material Prices Will Not Go Down

INTERESTING reasons are ascribed by building material manufacturers as to why the prices of building materials have not a tendency to go down, but chief among them is lack of labor and because the demand on the scant supplies will be great. It is noticeable that most manufacturers refer to the fact that it will be difficult for them to obtain labor-saving machinery in quantity to offset this scarcity of labor because the scarcity of steel will be such as to make the cost of this sort of equipment exceedingly high in the face of the probable export demand, says the Dow Service Dandy Building Reports.

It is further cited that even with such additional machinery in their possession the restrictions of the Government regarding building will make it difficult to erect plant extensions for some time because construction of administration buildings, terminals, etc., will absorb much of the contracting organizations immediately upon the conclusion of war.

Loading All Cars Obtainable

DES MOINES, Ia.—Lack of cars alone have hampered the Portland Sand & Gravel Co. from doing a capacity business the past year, according to C. W. Grant of the company, who also states that they have shipped 75 per cent of capacity and have loaded all the cars they could get.

One concern here is selling a "concrete mixture" composed of 35 per cent ½ in. gravel at 50 and 60, and one in. gravel 50 per cent sand, at 65 and 70.

Keep Accurate Books Says Income Tax Commissioner

WASHINGTON, D. C.—The keeping of even the simplest system of books would greatly reduce the bad debt loss of the country, points out the Commissioner of Internal Revenue in a letter urging that books be kept so that there will be no difficulty in arriving at the amount of the tax due the Government under the war revenue law.

"In many businesses, taxes will be one of the largest items of expense," declared the Commissioner. "It is of the utmost importance, therefore, that every concern, large or small, whether corporation, partnership or individual, shall maintain an exact record of its receipts and expenses—in other words, keep accurate accounts. Taxes should be considered as an expense for the year for which they are assessed rather than for the year in which they are actually paid, and the necessary reserves should be provided at once."

No special system of accounts is prescribed by the Treasury Department, but it is pointed out that the books should show in detail inventories, purchases, sales, capital investment, depreciation, and similar items required in making up income tax returns.

Because of the large amounts to be collected under the revenue bill, the bureau of internal revenue will be compelled to check the tax returns filed by taxpayers more closely than ever before. Therefore, he who is able to place before the agents of the bureau book records showing exactly how he arrived at his statement of net income will not only greatly facilitate the Government's task of collecting the war revenues but will save himself the annoyance and expense incident to satisfying the bureau that his return, if made on any basis other than that of actual bookkeeping, is correct.

Eastern Producers of Mineral Aggregates Busy

CONSTRUCTION WORK for the War and Navy Departments and the U. S. Emergency Fleet Corporation have given producers who can ship by water all the business they could handle. The situation in the Philadelphia district is so acute that some Government construction work may have to be curtailed for want of concrete aggregates. The combined output of all the producers in the district who can deliver by barge is only about a half of the estimated quantity required before Jan. 1.

In this district the Price Fixing Commission of the Federal Trade Board allows prices as follows: The basic price of sand at the dredge is 55 cents per ton and 60 cents delivered in barges alongside the wharf; the price of pebbles or gravel is $1 per ton delivered on barges alongside wharf; the basic price of bank gravel is 95 cents per ton f. o. b. plant.

Practically all this material is dredged. Some of the dredges are provided with crushers and the material is prepared afloat. With some the gravel is crushed ashore and rehandled. It can readily be seen that there is no profiteering with these prices. In the Baltimore district the Navy Department is still buying sand as low as 40 cents per ton.

There has been practically no market for crushed stone in competition with these dredged aggregates, except that the great demand for crushed gravel and pebbles has compelled the use of some crushed stone by rail deliveries. Although they had a "hearing" with the Price Fixing Commission last summer the crushed-stone producers have not yet been informed what price they are going to get for their material. Although to help out in the emergency they have been furnishing material for several months they haven't yet received anything for it.

In the Philadelphia district meetings of all producers are held regularly twice a week with representatives of the Government construction departments. The needs of the next few days are discussed and all orders are allocated to the producers best capable of filling the orders.

War Industries Board Defines Non-Essential Buildings

WASHINGTON, D. C.—The war industries board made public today a list of seventeen types of nonwar construction projects which it holds can most easily be postponed for the period of the war. They are:

Churches, schools, hotels, office buildings, bank buildings, public buildings, moving picture houses, theaters, and other amusement places, apartment buildings, nonwar factories, mills etc., commercial enterprises and store buildings, gas and electric light plants, grain elevators, water works improvements, sewerage systems, garages and gasoline stations, sidewalks, and park improvements.

"It is imperative," said the war industries board's announcement, "that there should be not the slightest slackening in the work of war industries."

Passed By The Screens

Incorporations

Ohio Buff Sand Stone Company, Cleveland, Ohio; $100,000 to $150,000.

Columbus Sand and Gravel Co., Columbus, Ohio; $20,000; W. H. Jones.

British-American Feldspar, Limited, Toronto, has been incorporated with a capital of $100,000.

Sheridan Potash Co., Alliance, Box Butte County, Nebraska; capital, $50,000. Pres., E. T. Kibble; vice-president-treasurer, J. O. Walker; secretary, B. Kibble.

The Beacon Hill Sand & Gravel Co., Matawan, N. J., has been organized to deal in sand, gravel, etc. Owen P. and Eugene A. McDonald and John P. Loyd are interested in the company.

Brooklyn Potash Co., Brooklyn, N. Y., has been incorporated under the laws of New York with a capital of $50,000. Incorporators: M. L. Scott, M. Kiss and O. E. Edwards, 226 76th street, Brooklyn.

Application will be made to the governor of Pennsylvania by K. O. Statler, F. M. Karr and D. G. Gates for charter for an intended corporation to be called Windber Silica Sand Co. Forest and Percy Allen Rose, solicitors, Somerset, Pa.

Quarries

The Whiteside Marble Co., Atlanta, Ga., has shut down its plant until after the war, ROCK PRODUCTS is notified.

Bernard Steuer, of Easton, Pa., has planned to install equipment for the development of 46 acres of a limestone deposit on the Cox farm, Pinckneyville, N. J.

The Greenvillage state stone quarry near Chambersburg, Pa., has become quite an industry. At last reports 50 men were engaged on the work.

The Southern Limestone Co. at Engle, W. Va., with a view to extending its operations, has leased the old Buckle farm from E. E. Allen. The parties to the lease agree on a minimum consideration of $300 a year for the stone and mineral rights on the place. The company to pay for stone quarried on it at the rate of 2 cents a gross ton, with an option to buy the land outright at $65 per acre within a year. There are 134 acres in the farm which adjoins the main line of the Baltimore & Ohio Railroad for 1,000 feet.

Personals

Major Henry S. Spackman, of the Henry S. Spackman Engineering Co., of Philadelphia, has been promoted and is now Lieutenant Colonel Henry S. Spackman, Corps of Engineers, U. S. A.

Frank Jones, general manager of the Canada Cement Co. and a member of the Canada War Trade Board, it is again rumored, will be appointed Minister of Trade and Commerce in succession to Hon. Sir George E. Foster.

S. R. Frost, who was superintendent of the Durham Cement Works, Durham, Ont., until recently, has accepted a position as Works' Engineer of the American Cyanide Co., Niagara Falls, Ont., manufacturers of nitrates.

Manufacturers

Walter A. Zelnicker Supply Co. announces the appointment of R. H. Wilson as assistant to the president, with office at St. Louis. Mr. Wilson, who has been with the company for years, latterly as Houston representative, is succeeded there by E. O. Griffin, well known in southwestern railroad circles for the past twenty years, as storekeeper and assistant general manager of the International & Great Northern, and more recently as assistant to president, St. Louis Southwestern Railroad, in charge of purchases.

Potash

A ten-ton plant will be erected by the Sheridan Potash Co., of Alliance, Neb., on a lake of about eight acres.

The Liberty Potash Co., Sheridan, Wyo., has planned the erection of a plant to extract potash from lucite rock, a deposit of which has been found at Superior, Wyo.

Nebraska is now producing right around 700 tons of potash a day. Next to the packing industry the potash industry is Nebraska's largest manufacturing institution.

Swift & Co. interests are hard at work developing the Bradburn potash lands in Utah. Machinery for the plant has arrived at Marysvale, Utah. The concrete foundations are ready at the mine, which is near Marysvale.

The potash industry will bring upwards of $25,000,000 to Nebraska during 1918—all made from raw material that four years ago was not only worthless but deemed a great nuisance. The weekly payroll of the potash plants of Nebraska doubtless exceeds $125,000 a month.

Unless a larger supply of wood ashes is obtained, the Green Bay Potash Co., Green Bay, Wis., which is manufacturing potash for use of the Government in the war, will have to shut down its plant. State chemists are appealing to residents of that section of the state to save their wood ashes to keep this essential war industry in operation.

A report from Sierra Blanca, Tex., says that the extracting of potash from the common wild desert grease-wood shrub may be developed into a large industry in the Southwest according to the statements of men who have conducted successful experiments in utilizing the shrub for this product. It is claimed that 100 tons of grease-wood will give a yield of more than seven tons of ash, from which about two tons of potash may be extracted. The ash may be used in that form as a fertilizer.

Cement

The Crescent Portland Cement Co., Wampum, Pa., has bought 18 acres of coal and limestone land in Big Beaver Township and will increase its capacity.

The Federal Cement Co., Philadelphia, Pa., has filed an involuntary petition in bankruptcy. John M. Hill, Penn Square Building, has been appointed referee.

The Atlas Portland Cement Co., Philadelphia, Pa., with works at Northampton, is devoting practically the entire output of its plant to Government contracts. Large quantities of its product are being shipped to Virginia and West Virginia for Government use.

The San Joaquin Portland Cement Co., Porterville, Cal., recently incorporated with a capital of $750,000, is planning a new cement plant near Worth with initial capacity of about 350,000 bbls. of cement per annum. About 160 acres of land have been purchased and it is said that the territory offers sufficient limestone to produce 5,000 bbls. of cement daily for many years to come. The company is expected to be in the market for considerable machinery and equipment in the near future. W. J. Dinglee, who directed the construction of the plants of the Standard Cement Co. at Napa, Cal., and the Santa Cruz Portland Cement Co., Santa Cruz, Cal., is interested in the new company.

Phosphate

The Standard Chemical & Oil Co., Troy, Ala., is having plans prepared for the reconstruction of its fertilizer and acid phosphate building recently destroyed by fire, with loss estimated at $200,000. The new plant will be about 180x400 ft.

Lime

The Quartermaster Corps has recently ordered for use in construction work of various kinds, 1,995 tons of hydrated lime.

The farmers of Logan county, Illinois, have ordered 40 carloads of limestone. The Logan county bureau has obtained prices on limestone and has them on hand for the use of any farmer who wants to know.

The chemical bureau of the Lime Association, Washington, of which Allen D. Whipple is chief engineer, wishes to purchase a high-grade microscope, an essential in the laboratory. Instruments like these are difficult to find on the market.

Engineers have been in Bellefonte, Pa., laying out plans for the proposed new hydrating plant for the American Lime & Stone Co. The plant will be chiefly of concrete and will cost $400,000 or more. A. G. Morris is president of the company.

The Edison limestone quarries, near Oxford Furnace, N. J., have been furnishing considerable material for essential work. The properties are among the largest in the state and are operated by the Edison Pulverized Limestone Co. Capacity at the plant has reached at different times a total of about forty 50-ton loads a day.

Sand and Gravel

Beder Wood's Sons, Moline, Ill., have closed down their pit for the winter.

Lowry F. Sater, trustee of the Ohio Gravel & Sand Co., has been authorized by Judge Kinkead to sell for $17,000 the property and equipment to the W. S. Callahan Co.

The Horning Gravel Co. has disposed of its interests at the Highbanks, Mich., to the Detroit Sand & Gravel Ballast Co. The plant is under the management of Mr. Allerdyce.

P. J. Greeley, Cleveland, has opened a new sand bank. His old sand pit is on Euclid Ave., at East 71st St. Aside from building, Mr. Greeley furnishes sand to many of the plants in this section working on war munitions.

The city of Huntington, W. Va., which recently purchased 17 acres, a country club site, from G. W. Davis, has discovered a deposit of gravel on the site and a creek which flows through the grounds contains fine washed sand, which is washed down with the spring freshets. The city is already using the material in paving work.

The Rockton Molding Sand plant, at Rockton, Wis., was destroyed by fire two weeks ago. The fire was discovered by Wayne Liddle, who called E. B. Manley, the proprietor. As there is no water main in the vicinity, the buildings were burned to the ground in about 15 minutes. F. A. Tanner, of Harvard, Ill., is in partnership with Mr. Manley. The loss was estimated at $5,000 as the sand milling loading machine was destroyed. The loss is partly covered by insurance.

Retail Dealers

R. G. Evans & Son, Inc., Salisbury, Md., building supplies, are in the market for machinery for manufacturing sand-lime brick.

Anderson Lumber Co., Velva, McHenry County, N. D. To deal in lumber and building material. Capital, $25,000. Directors, N. I. Nichols, Albert Dickinson, N. A. Anderson, Velva, N. D.

Independent Fuel Co., Kenosha, Wis., dealers in fuel, building material, brick, lime, cements, etc. William M. Meyer, Elizabeth Gregory, George W. Taylor, all of Kenosha. Capital, $10,000.

The Ohio Builders' Supply Association, for the purpose of economy in war time, have moved their offices to the office of the Cleveland Builders' Supply Co., Cleveland, O. W. T. Rossiter, president of that concern, is also president of the association.

United War Work Campaign for the Boys Over There

THE UNITED WAR WORK CAMPAIGN which will launch a drive for $170,500,000 on November 11, lasting one week, includes seven organizations which are recognized in the United States and in France as among the most valuable aids in keeping up the morale of the army and thereby helping win the war.

These seven organizations, four of which are serving under fire, are marching with the soldier from his own front door through the training camps at home on to the Atlantic transports and through the little villages of France to the firing line. Each one of the seven has found its own special work in the war and there is no duplicating or infringing. They have been working together many months with zealous co-operation of the allied armies, and now come before the American people with a co-operative plea to forget creed and race and give for the welfare of the boys in khaki and blue.

The activities of the Young Men's Christian Association are generally known. This organization is asking for $100,000,000.

Y. W. C. A.

The Young Women's Christian Association, which needs $15,000,000, is doing a special work for the women and girls engaged in war work in factories and near the battlefield. It has built about 100 hostess houses in camps for the soldiers and has club centers even in Russia. The English government has asked the help of the Y. W. C. A. in England.

Knights of Columbus

The National Catholic War Council, including the Knights of Columbus, asks $30,000,000. The knights have erected "Everybody Welcome" club houses in cantonments, at points of embarkation in this country and debarkation in France, and have secretaries doing duty on all transports. They also provide the boys "under fire" with necessities.

Jewish Welfare Board

The Jewish Welfare Board, seeking $3,500,000, has its trained workers in camps and naval stations. It has erected club rooms for all soldiers, irrespective of race and is doing other social work.

Library Association

The American Library Association, which asks for $3,500,000, supplies a book for the man when he wants to read and the kind of book that he wants. It furnishes technical books if he wants to study. Branch libraries are maintained in all huts, canteens, every transport and in every hospital.

Community Service

The War Camp Community Service, which asks for $15,000,000, looks after the soldier who is off duty in a strange town, providing him with entertainment and enabling him to meet good men and women.

Salvation Army

The Salvation Army, which asks for $3,500,000, does relief work as near the trenches as it is possible to go and serve hot food to the men under fire. The lassies mend the clothing and darn the stockings of the soldiers. It also maintains hotels for soldiers.

CLASSIFIED ADVERTISING

ADVERTISEMENTS in this department are for Positions Wanted, Positions Vacant, Business Opportunities, Plants for Sale, etc.

RATES: 25c per line, per insertion; minimum charge, 50c. With display of any sort, $2.50 per column inch, per insertion.

Plants for Sale

FOR SALE
ONE KILN LIME PLANT

Agricultural limestone pulverizing plant badly needed. Analysis of rock CaCo 96.89, MgCo 1.00. Owner wishes to sell on account of other business; will sell controlling interest or entire plant and quarry. Address:

T. E. HOPSON **Ft. Towson, Okla.**

FOR SALE

Five 10 ft. Morgan Gas Producers, complete with George Automatic Feeds. This is a complete Gas Plant with all flumes and necessary connections.

For particulars address

J. E. BAKER COMPANY
114 North George Street **York, Pa.**

FOR SALE OR LEASE: Crushed stone quarry situated near Wilkes-Barre, Pa. Very hard green sandstone, practically equal to trap rock for road material. Quarry equipped to produce five to six hundred tons per day—has frequently run eight hundred. Ample rail facilities and an extensive market. For detailed information communicate with Arthur L. Stull, 182 S. Franklin St., Wilkes-Barre, Pa.

FOR SALE—Limestone crushing plant with 5 lime kilns. Forty acres stone land. Eastern part of Indiana. Details furnished. Address Box 1264, care ROCK PRODUCTS.

PUBLIC SALE
OF
Valuable Lime & Limestone Plant & Farm, Duncansville, Pa.

November 12, 1918

at 2 o'clock P. M. 54 Acres of fertile limestone land, good orchard, large house and new barn. Quarry equipped with two large lime kilns, 2 motors, tracks, large crusher, 100 ton capacity, scales, tramroad connecting with railroad siding. A splendid opportunity for good investment.

For further information address

H. L. STULTZ, Hollidaysburg, Penna.

FOR SALE
CRUSHED STONE PLANT
in Central New York

Exceptional production facilities and quality of stone for fluxing and commercial purposes. Market for entire production. Labor and Material guaranteed. Address

Box 1278, care ROCK PRODUCTS

Help Wanted

WANTED: Competent man to take charge of stone quarry producing crushed stone for railroad ballast, highway purposes and concrete work. State age and experience, also salary required, as well as where last employed. Address Box 1254, care ROCK PRODUCTS.

WANTED—Driller to operate Cyclone well drill with gas engine power. Steady work, good accommodations and good pay. Quarry located seven miles southeast of East St. Louis. Address Stolle Quarry Co., East St. Louis, Ill.

A LIME COMPANY has an opening for a superintendent. He must be an experienced man, thoroughly familiar with quarry operations; the manufacture of high calcium lime, and hydrating. The company is financially strong, well-established and makes a high-grade product. This is an excellent opportunity for a capable man. Give details of yourself. All replies will be held in strict confidence. Address Box 1277, care ROCK PRODUCTS.

Plant Wanted

WANTED
SMALL LIME PLANT
in northwestern Ohio.

Give analysis of stone

Address Box 1274, care Rock Products

Capital Wanted

Additional Capital Wanted

In Crushed Stone and Slag Business

Plants in daily operation and entire output sold of Stone, $2.50 per ton and Slag, $1.50 per ton f. o. b. quarry.

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ADVERTISEMENTS in this department are for the Sale and Want of Second-Hand Machinery and Equipment.

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LOCOMOTIVES
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CARS
RAILS
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CRUSHERS
COMPRESSORS, ETC.

Try us for honest value in dependable "used" material of this character.
WE'LL TREAT YOU RIGHT.

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PHILADELPHIA, PA.
Dealers in "Used" but "Not Abused" Machinery

FOR SALE

Class "B" Lidgerwood Excavator in good condition. 60 foot boom. 1½ yard Page Bucket.

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a set of 42 inch rolls for crushing rock

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Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

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COMPLETE STONE CRUSHING PLANT

Capacity 400 tons per day—Consists of
1—90-hp. Horizontal bricked-in Boiler.
1—75-hp. left drive girder Engine, H. B. Farquhar manufacture.
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Drills, Storage Bins and every necessary facility for up-to-date plant.
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1—Porter Locomotive, 9x16", in fair condition.

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The above machinery must be sold at once. If you are looking for a bargain, have this machinery inspected.

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At Bargain Price

1 Little Giant Steam Shovel,
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Flat Wheels: 12½" face. Gauge of wheels. 9' 2½"; inside to inside of wheels 8' 2½".
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Sales Department
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1 Sullivan Air Compressor, complete, 8x10.
1 Sullivan Class D. P. 33 Air Tube Rotator Drill, with Hose.
6 sets of two Drills each from 2 feet to 12 feet. This equipment in first class condition and not driven over 100 feet. Will sell cheap, have no use for it.

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Used steam drill and six brand new End Dump Steel Quarry Cars, two yard capacity, equipped to handle from either end or side. Manufactured by Austin Manufacturing Co.

THE SHERMAN NURSERY COMPANY, Charles City, Iowa.

FOR SALE

Thew O Traction gas driven shovel.
2 2-yard Owen Clam buckets.
McMyler Whirlie 50 ft. boom with bucket.
8 12-yard S. G. Western Cars.
60 ton 6 w. switcher S. G.
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16-20-25-40-70-80
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(STRONGEST IN OHIO)

Bulk and Barreled : "MASON'S HYDRATE," for Brick-work, plastering and masonry : "LIME FLOUR," Hydrated Finishing Lime, Best on the Market : "CLOVER GROWER," Land restorer, for the farmer : "CARBO HYDRATE," Soil sweetener, crop producer.

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GREAT WATER AND RAIL FACILITIES BEST SERVE THE ENTIRE MIDDLE WEST
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EVERY BARREL TESTED AND GUARANTEED
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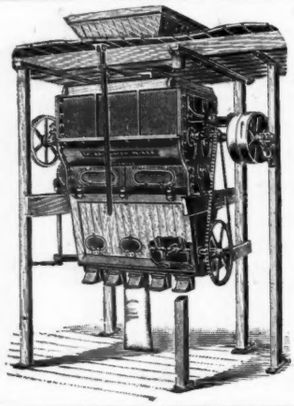
Friend Subscriber: Is ROCK PRODUCTS pleasing you? Can you suggest aught that will make the paper more serviceable to you? If there is any specific problem in the running of your plant with which we can help you, shoot along your questions for a personal answer by mail. Questions concerning engineering practice, production economy, government regulations, etc., cheerfully received and promptly responded to. —*THE EDITOR.*



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Is continuous in operation, and will thoroughly mix any dry materials as fast as two men can bag and remove.

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CEMENT MANUFACTURING PLANTS
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FOR elevators, dredges, lumbering, mining, oil-well drilling, suspension bridges, stump-pulling, cranes, derricks, ships' rigging and every other form of wire rope use.

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We are the largest distributors of Portland Cement, Lime Plaster, Fire-brick and General Building Material in the Southern States, and have stocks of Standard Brands at all of the Atlantic and Gulf Seaports, and at our interior mills and warehouses, for prompt and economical distribution to all Southern territory. Write for our delivered prices anywhere.

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THE OSGOOD 73—3½ yard steam shovel is designed throughout for the heaviest kind of service. It meets demands where maximum strength is required and severe work to be done, such as found in iron mines, rock works, etc.

It has all the features in good steam shovel construction which embody steel gears with machine cut teeth; manganese racks and pinions for dipper handle; cast steel swinging circle; heavy front end construction; especially strong boom; large boiler and water tanks; long car frame; enclosed firing platform; steam hoisting friction; by-pass throttle, etc.

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John F. Byers Machine Co
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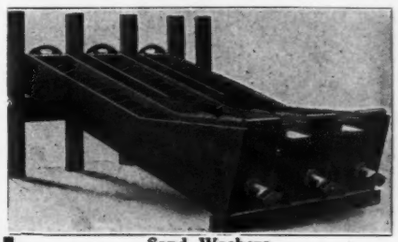

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Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete. Write for prices and catalog

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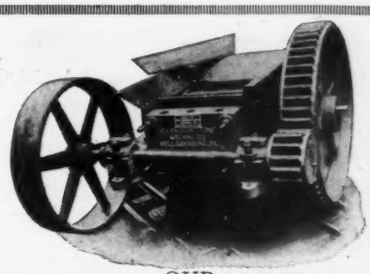

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CRUSHING-WORLD KNOWN
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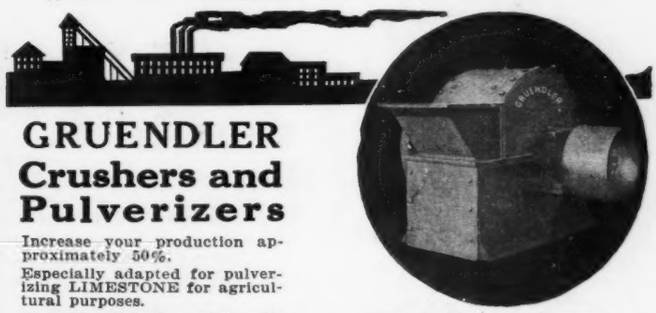

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Especially adapted for pulverizing LIMESTONE for agricultural purposes.

A most efficient machine for large production, small power consumption and BIG PROFITS.

The double-ended hammer arrangement is the reason—let us explain it.
Six sizes carried in stock.

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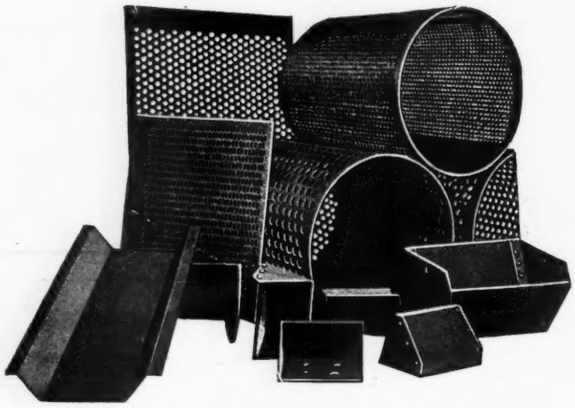

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General Sheet and Light Structural Work

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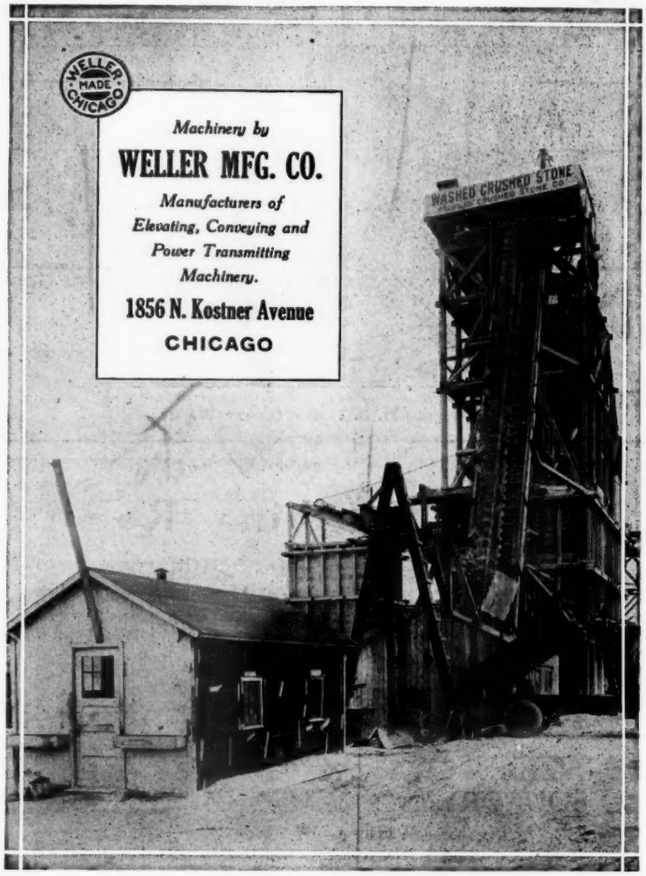

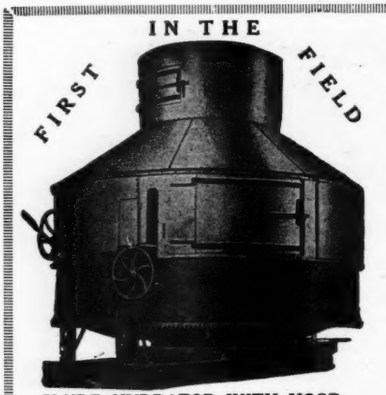

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"The common sense way"

The CLYDE LIME HYDRATOR

The simplest and easiest to operate. The most economical in Installation, Maintenance and Operation. Makes a **perfect hydrate** of either High Calcium or Dolomite Lime.

Price, per ton capacity, only three-fifths of any other Hydrator on the market.

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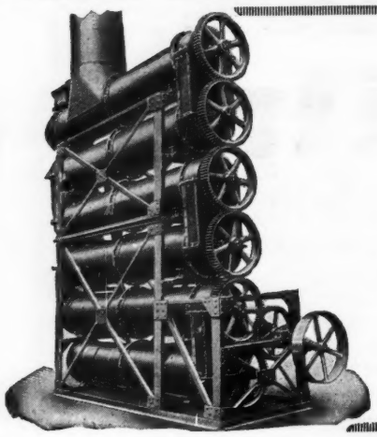
Patentee and Sole Manufacturer.



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THE KRITZER WAY

Insures a product which has a standard market value. We install plants complete, designed by our own expert engineers to meet local conditions and turn out a uniform grade of Hydrated Lime of the highest standard, and with the greatest economy in cost of production.

THE KRITZER CONTINUOUS HYDRATOR, AND THE ACCESSORIES INSTALLED WITH IT, ARE THE RECOGNIZED STANDARDS IN THIS LINE.

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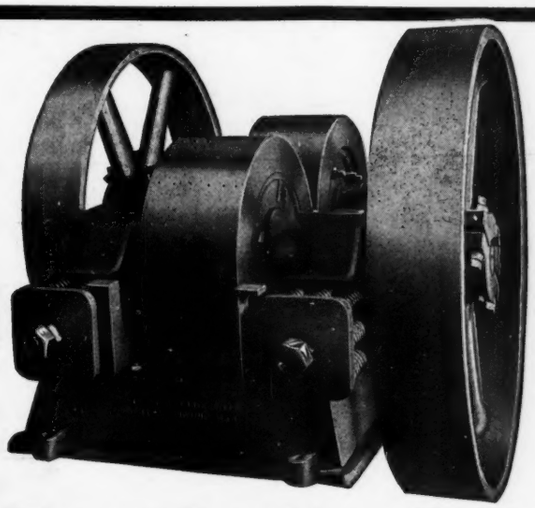

These Crushing Rolls

Will stay on the job a long time without repairs, due to their design and type.

They are of rugged construction and will crush wet or dry ore in quick time.

Write for information and learn of the many features of these crushing rolls.

WEBB CITY & CARTERVILLE FOUNDRY & MACHINE WORKS
WEBB CITY, MO.

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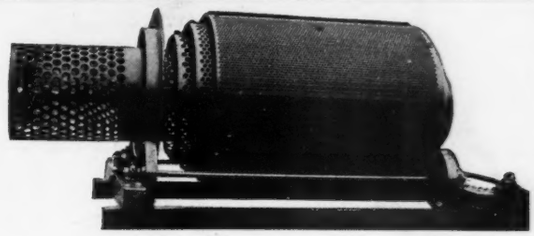
CYLINDERS

DUST JACKETS

MADE TO FIT ALL MAKES AND SIZES OF REVOLVING SCREENS



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SAND and GRAVEL SCREENS

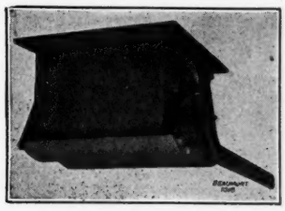
CYLINDERS **SCREEN PLATES**

CONICAL SCREENS

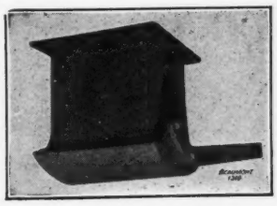
EVERYTHING IN SCREENS

QUICK SHIPMENTS

JOHNSTON & CHAPMAN CO., 2921 Carroll Ave. CHICAGO



Duplex Gate



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BEAUMONT BIN GATES

These Gates are made of best quality cast iron, of excellent workmanship. They are usually fitted with hand lever, but can be furnished with any type of control demanded by the conditions.

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New York: 50 Church St. **Boston: 141 Milk Street**

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Vulcan Iron Works

WILKES-BARRE, PA.

Experienced in designing and manufacturing Rotary Kilns for calcining of Lime, Cement, Dolomite, Magnesite, etc., together with their auxiliary equipment of Dryers and Coolers.

Drying installations for sand, all grades of rock, silica, and other materials requiring special treatment.

Quarry, Industrial and Long Haul **Locomotives** of all descriptions

FIREMEN ARE SCARCE

Powdered fuel burned through a Lopulco System eliminates hot, arduous fireroom labor.

We will be glad to submit plans for converting your present plant.

We design and build complete installations—we deliver them in operation.

Locomotive Pulverized Fuel Co.
Industrial Department
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Sullivan Double Arc Bit

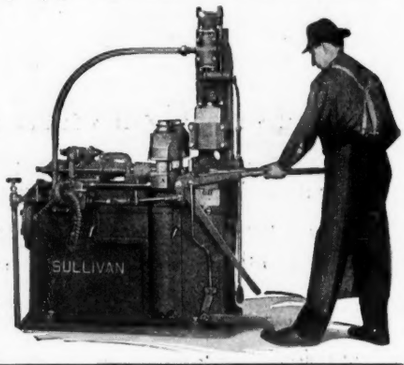
Drill-bits like this

and shanks—clean, uniform, correctly made, will increase your rock drilling speed and cut down your steel and drill repair bills. You can make bits and shanks rapidly and at low cost, for any type of rock drill or hammer drill, by the all hammer process in the

Sullivan Sharpener

Hammer Your Drill Bits!

Bulletin 3672



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G-W Loaders

reduce your labor list; increase the efficiency of the few necessary hands; keep your trucks busy and improve your service. *Dealer* or *producer* can use G-W Loaders to advantage.

Be sure you select G-W Loaders. The frames of light steel make them easy to move. The machines are collapsible so that they can be easily wheeled in sheds, etc. Other features explained in our literature.

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GIFFORD-WOOD COMPANY
Main Office: HUDSON, N. Y.
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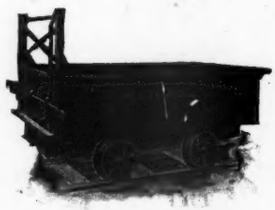
Lime Hydrators, Kilns, Calcining and Quarry Cars


No. 274
End Dump Quarry Car.

No. 217-H Rocker Side Dump Car
Also made in end dump. Above car made for loading with Steam Shovel.

Reduce Your Handling Costs by Using

Atlas Cars and Locomotives

Where a trolley wire or third rail is undesirable investigate our storage battery locomotives. Made in several styles and sizes. Cars to suit every requirement.

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"WE have in the past operated other shovels that are good, but the ERIE is the best, being by far the most substantial. Our first ERIE has been digging and loading hard gravel for three years without any repairs, although we have worn out a dipper."—(*Signed*) *N. H. Battjes, President, STANDARD BUILDERS' SUPPLY CO., Grand Rapids, Mich.*

The ERIE is the RELIABLE shovel, and gives steady service in the hardest digging.

Investigate carefully. Get all of the facts. Pick the best steam-shovel.

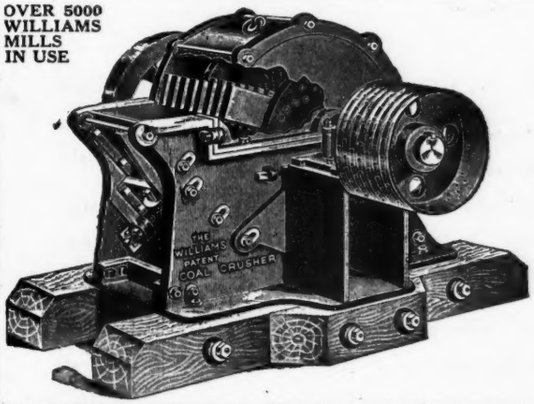
We will be glad to send you our Bulletin P. Write for it. Address:

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Steam-Shovels and Locomotive Cranes; **BALL Engines.**

ERIE Revolving Shovels BALL Engine Co. Erie, Pa.

"Nothing for repairs in three years"

OVER 5000 WILLIAMS MILLS IN USE



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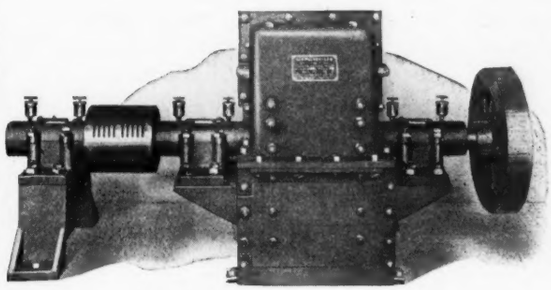
Williams Lump Lime Crushers will take in lime in cubes 10", 12", 14", etc., and in one operation reduce same to ¼", ⅛" or finer, as the case may be. Williams Lime Crushers are made in sizes ranging from a few hundred pounds up to 20 to 30 tons per hour, are therefore adapted to most any size plant. Parties considering installing Lime crushers to make either agricultural or hydrated lime, should investigate Williams Crushers, and secure Bulletin No. 4.

THE WILLIAMS PAT. CRUSHER & PULVERIZER CO.

General Sales Dept., 37 West Van Buren Street

Plant: ST. LOUIS — CHICAGO — 67 Second St. SAN FRANCISCO



The K-B Pulverizer

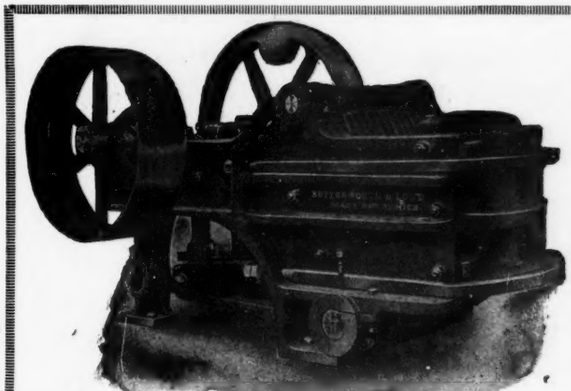
Will crush 3-in. pieces of any moderately hard material to dust in one operation. It is designed to do a large amount of work with a small consumption of power—and does it.

ASK US FOR PROOF

Send for Catalog with full particulars

K-B PULVERIZER COMPANY, INC. 86 Worth Street NEW YORK

K-B PULVERIZER



Nippers—17 x 19", 18 x 26", 20 x 30", 24 x 36" and 28 x 42"

JAW & ROTARY CRUSHERS

FOR ALL ROCKS AND ORES SOFTER THAN GRANITE

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

Special Crusher-Grinders for Lime

Butterworth & Lowe

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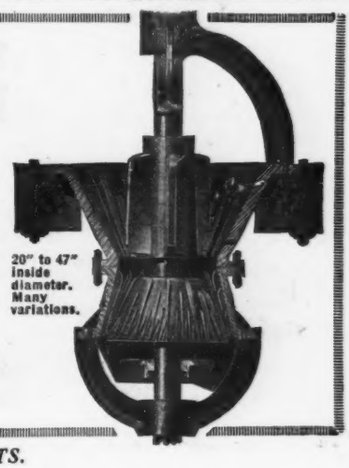
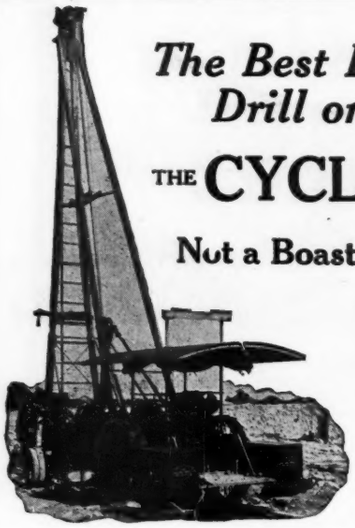


20" to 47" inside diameter. Many variations.

You will get entire satisfaction if you mention ROCK PRODUCTS.



The Best Blast-Hole Drill on Earth

THE CYCLONE No. 14

Not a Boast—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits in your quarry against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint—it eliminates talking points and evaporates hot air. It puts buying on a strictly engineering basis where it belongs.

Furnished in Steam, Gasoline, Compressed Air or Electric Power Traction or Non-Traction

Let us send you full particulars

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Eastern and Export Office, 50 Church Street, New York

UNIVERSAL CRUSHERS

The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy!

Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

Universal Crusher Co.
225 Third Street
Cedar Rapids, Iowa, U.S.A.

Ask for Folder 1918

Wash the waste rock! Get the mud out! Screen it! When you realize the useful material that is lying idle and useless in the tailings and screenings from your *limestone quarries,* you will resolve that it is not only a patriotic duty, but a profitable performance, to turn this great pile of waste material into a useful product —*agricultural lime*—for the benefit of the land, the glory of Uncle Sam—and your own advantage.

DULL

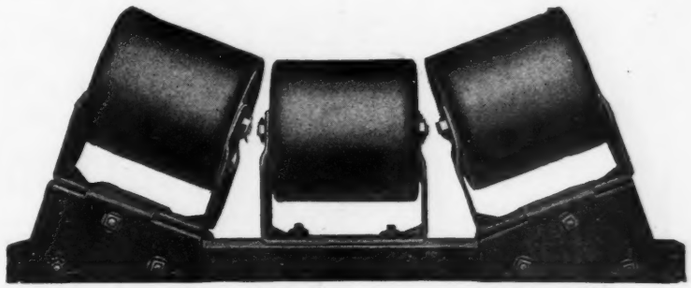
washing screens are of paramount importance. They accomplish results where many make a bad bluff at it. Wash and screen your limestone waste with greatest economy.

GET THE LIMESTONE OUT OF YOUR WASTE PILES— LET US SHOW YOU HOW

THE RAYMOND W. DULL CO.
1914 CONWAY BUILDING CHICAGO

The advertiser wants to know that you saw his ad in ROCK PRODUCTS.

Why do you have to give your Belt Conveyor constant attention and daily lubrication? Why does your plant shut down while you are required to replace broken carriers?



S-A UNIT CARRIERS

offer a successful solution to these points and it will pay you to investigate.

The all steel construction insures indestructibility. The dust-proof smooth running ball bearings positively minimize belt wear and reduce the horse power required to operate the conveyor. The **Unit Carriers** will operate for six months without attention. After six months' continual service we recommend inspection and lubrication if necessary.

S-A Unit Carriers have operated successfully for a period of from two to three years with absolutely no attention whatever.

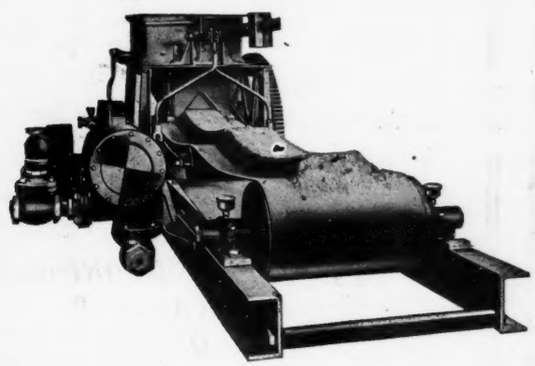
If you are interested in making your Belt Conveyor more dependable and more economical to operate, you should have our engineers send you cost saving data.

STEPHENS-ADAMSON MFG. COMPANY, AURORA, ILL.

BRANCH OFFICES:

NEW YORK, PITTSBURGH, BOSTON, HUNTINGTON, W. VA., ST. LOUIS, CHICAGO, DETROIT, LOS ANGELES, SALT LAKE CITY, TORONTO, ONT., CAN.

The Schaffer POIDOMETER



IN these days of labor scarcity and high prices, it is of utmost importance to obtain the maximum results with the minimum of hands.

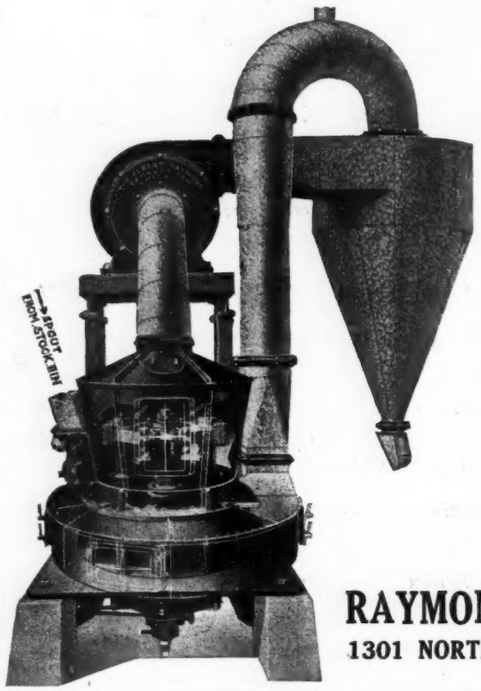
The Schaffer Poidometer works automatically with clock-work accuracy, delivering the desired number of pounds of material per minute, per hour, per day.

Send for our interesting literature about this wonderful labor-saving device.

Schaffer Engineering & Equipment Company

TIFFIN, OHIO

We have specialized in the grinding of materials to a fine powder for forty years and that explains why the



Raymond PULVERIZING Air-Separating System

has been so successful in replacing grinding mills with which the use of screens or bolting reels were necessary in order to produce a uniform fine powder.

It is easy to see why it is more economical to use one unit to produce a desired result instead of using several units with their upkeep expense and labor necessary to supervise their operation.

The Raymond System besides being one complete unit requires less than half the attention required by other machinery to produce the same result and at the same time turns out a larger capacity and more uniform product for the same initial investment.

A Raymond System in your plant will produce large economies.

Write us your requirements. They will be given our personal attention.

RAYMOND BROS. IMPACT PULVERIZER COMPANY
1301 NORTH BRANCH STREET, CHICAGO, ILLINOIS

Avoid Crusher Troubles

The Superior-McCully Gyratory Crusher has features that you will find in no other standard type of gyratory crusher. Its new improvements will end your crusher troubles. Designed to overcome the faults usually found in gyratories, this machine from the start has enjoyed remarkable success. Over 100 now in use.

SUPERIOR McCULLY GYRATORY CRUSHER

PATENTED

Life of "Eccentric and Gears" are lengthened 200% because all dust and grit are absolutely excluded and Cut Gears run quietly in oil. Main shaft is 60% stronger than Standard Gyratories of corresponding opening. Area of eccentric 100% greater than any other machine of equal size.

Capacities—30 to 1,000 tons per hour, built in sizes from 10 in. to 54 in. opening.

Recent orders received for Superior McCully Gyratory Crushers from prominent Lime and Cement manufacturers.

Lehigh Portland Cement Co., International Portland Cement Co., Cuban Portland Cement Co., Standard Lime & Stone Co., Rock Cut Stone Co., Lehigh Stone Co.

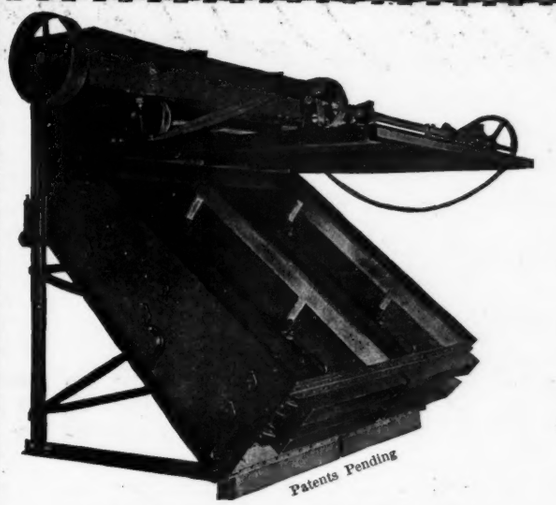
Let us tell you how we overcome common crusher troubles

Ask for Bulletin .

WORTHINGTON PUMP AND MACHINERY CORPORATION

NEW YORK OFFICE, 115 Broadway Power & Mining Machinery Works, CUDAHY, WIS.
CHICAGO OFFICE, 820 Old Colony Building
Branch Offices in all Principal Cities

M474



WHIP-TAP SEPARATOR

Screens, Limestone, Silica, Gravel, Phosphate Rock and other Rock Products

A TAUT SCREENING SURFACE Effectively Vibrated

The free screening action and large capacity of the WHIP-TAP Separator are directly due to the tension and vibration maintained on the screen cloth.

Every cross wire of the WHIP-TAP screening surface is stretched taut, and the tension can be increased or decreased by merely turning a key, just as you would tighten the head of a drum.

This smooth, drumhead tension screening surface of the WHIP-TAP is vibrated by means of recoiling hammers. The intensity of the vibration is so regulated that the material flows uniformly over the entire screening surface, producing a thorough separation of the fine particles from the coarse.

LESS THAN ONE HORSE-POWER IS REQUIRED TO OPERATE THE WHIP-TAP

THE W. S. TYLER COMPANY

Manufacturers of TYLER "Double Crimped" Wire Cloth and Ton-Cap Screen **CLEVELAND, OHIO**

Stroh Steel

THE result of a secret process of casting Stroh Alloy (which is harder than the finest tool steel) with a softer and less expensive metal at one pouring. This method makes the surface of the casting wear-proof, with a guarantee of greater service per unit of cost.

WEARS FROM 3 TO 10 TIMES LONGER THAN ORDINARY CASTINGS

Get details of the Stroh process: STRONG—where necessary. TOUGH—where necessary. HARD—where necessary.

STROH STEEL HARDENING PROCESS CO.
PITTSBURGH, PENNSYLVANIA

F. LLOYD MARK, Monadnock Bldg., Chicago, Western Representative
HICKOCK & HICKOCK, Portland, Ore., and San Francisco, Calif., Coast Representatives

Wherever Fuse is Used

whether it be for the great record-breaking 180,000 ton blast made early this Spring by the Bethlehem Mines Corporation, or for the every day affairs,

CORDEAU-BICKFORD FUSE

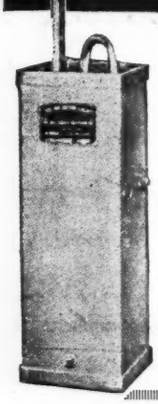
becomes the choice for efficient, sure results. It adds 10 to 20 per cent to the efficiency of explosions—can be set for discharge at one time, in groups or seriatim.

Not sensative to shock or friction—it's safe

THE ENSIGN-BICKFORD CO.
SIMSBURY, CONN.

The Original manufacturers of Safety Fuse

ESTABLISHED 1836



Turn Night Into Day

by using a

NEW MILBURN
Portable Carbide Light

The kind that burns ordinary carbide that's sold everywhere.

Mines equipped with New Milburns are independent of dark days—independent even of nightfall—for the wonderful New Milburn Lights, with capacity up to 25,000 candle power, give a powerful illumination that turns night into day.

They cost from 1c. to 4c. an hour, depending on candle power.

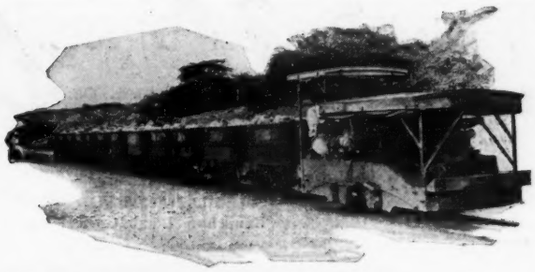
They operate absolutely automatically and require no attention.

They don't overgenerate—and you CAN'T overcharge them.

They require only water and ordinary carbide, sold everywhere.

Circular 236 tells more about them!

THE ALEXANDER MILBURN CO., Baltimore, U. S. A.
Manufacturers of Portable Carbide Lights and Oxy-Acetylene Apparatus



Making Production "Hump Itself" in the West Indies

PRODUCTION managers in America aren't the only ones who "have their troubles"—nor are they the only ones who know where to turn when the supply of skilled labor runs low.

Messrs. John Godden & Co., managers of a big Phosphate Rock Mining Concern in Curacao, West Indies, are constantly up against the problem of keeping to capacity with untrained native helpers.

Several years ago they outgrew ordinary facilities, so, in 1915, they bought a PLYMOUTH Gasoline Locomotive and set it to work.

In 1917, with orders still on the climb, they purchased another PLYMOUTH; and, in expressing their satisfaction with both Locomotives, they write

Two PLYMOUTH Locomotives Hauling Phosphate Rock—Powerful, Easily Operated

"Each has given complete satisfaction, while their simplicity of operation is important where one has native labor to deal with."

Messrs. Godden & Co. appreciate the ease of keeping their Locomotives in active, profitable service. Then, the PLYMOUTH'S ability to run right along, month in and month out, with a minimum of lost time due to repairs and replacements, is a big object when working so far away from "the home base."

Write Us About Your Hauling

PLYMOUTH Gasoline Locomotives are ready to do *your* hauling in just this same business-like, efficient, economical way. They are an established success—design and performance proved right through years of testing out in a wide variety of industries.

Write us about your hauling requirements, and let us furnish details and tell you where you can see PLYMOUTH Gasoline Locomotives at work. No obligation in making the request.

THE J. D. FATE COMPANY

210 Riggs Avenue **PLYMOUTH, OHIO**

Sales Representatives in all Principal Districts

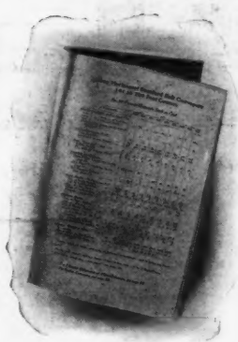
6

Here's a Complete Text Upon the Belt Conveyer

The Best in Belt Conveyer practice has been collected and printed in this Catalog, the scope of which may be gathered from the following subjects, presented in a style both interesting and instructive:

Early Types of Belt Conveyers.
Improvements in Type for Better Service.
Industries using Belt Conveyers.
Typical Applications for Belt Conveyers.
Condensed Data for the Busy Engineer.
Belt Tension and Horse Power Pull.
General Tables of Belt Capacities.
Belting Facts in Widths, Plys and Covers.
Protecting the Life of The Conveyer Belt.
Curve of Belt from Horizontal to Incline.
Various Forms of Belt Conveyer Drives.
Spacing of Conveyer Parts for Best Service.
Methods of Loading and Unloading Belts.
Jeffrey Belt Conveyer Parts.
Conveyer Belting of Various Kinds.
Unloading Trippers and Installation Views.
Rules for Using "Standard" Conveyers.
Tabulated List of the "Standard" Conveyers.
General Dimensions for Installing "Standard" Conveyers.
Tabulated Weights of Various Materials.
Jeffrey Belt Conveyers in Many Industries.

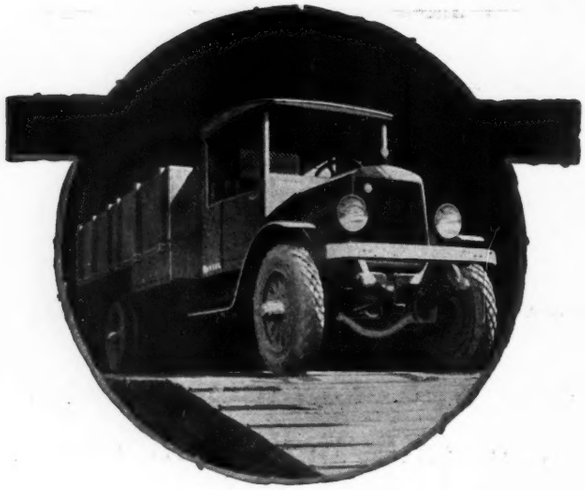
Every Engineer, Contractor or Manufacturer who is interested in saving Time, Labor, and Expense in the handling of materials needs this book.



One of the specification spaces of the new Catalog

Write TODAY for copy of Catalog No. 175-A

The Jeffrey Mfg. Co.
COLUMBUS, OHIO



Never before has the need of dependability and adaptability in motor trucks been so apparent in the rock products industry as today.

KISSEL, realizing this, has incorporated in the vital structural parts of Kissel Trucks those engineering principles and construction features which ten years of motor truck designing and constructing experience have proven to produce unlimited power, ability for continuous service and low operating cost and upkeep.

The ALL-YEAR Cab, an exclusive Kissel Truck feature, insures uninterrupted performance, no matter how severe the weather may be. *In summer, it is an open, cool cab; in winter, it is completely enclosed, increasing the driver's efficiency, by giving him complete protection.*

There is the right size truck for your requirements. See your nearest Kissel Dealer, who has specifications, prices, etc. See him without delay.

KISSEL MOTOR CAR CO., Hartford, Wis., U. S. A.

KISSEL TRUCKS

Classified Business Directory

BAGS AND BAG MACHINERY
Jaite Company, The
Urschel-Bates Valve Bag Co.

BIN GATES
Beaumont Co., R. H.

CARBIDE LIGHTS
Alexander Milburn Co., The

CALCINING MACHINERY
Atlas Car & Mfg. Co.
Butterworth & Lowe

CEMENT, PORTLAND
Carolina Portland Cement Co.
Huron Wyandotte Portland Cement Co.

CHAINS AND TRANSMITTING MACHINERY
Stephens-Adamson Mfg. Co.

CONVEYORS AND ELEVATORS
Caldwell, H. W., & Son Co.
Jeffrey Mfg. Co., The
Webster Mfg. Company
Gifford-Wood Co.
Stephens-Adamson Mfg. Co.
Weller Mfg. Co.

CRANES
Locomotive Gantry
Ball Engine Co.
Byers Mach. Co., John F.
McMyler-Interstate Co.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin Mfg. Co.
Bacon, Earle C.
Bradley Pulverizer Co.
Butterworth & Lowe
Chalmers & Williams
Gruendler Pat. Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
K.-B. Pulverizer Co.
Kent Mill Co.
Lewistown Foundry & Machine Co.
McLanahan-Stone Machine Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulverizer Co.
Stroh Steel Hardening Process Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Webb City & Carterville F. & M. Works.
Williams Pat. Crusher & Pulverizer Co.
Worthington Pump & Mach. Corp.

DRILLS
Sanderson Cyclone Drill Co.
Sullivan Mach. Co.

DRYERS
Ruggles-Coles Eng. Co.

ENGINEERS
Bacon, Earle C., Inc.
Fuller Engineering Co.
Smidth & Co., F. L.
Schaffer Eng. & Equip. Co.

EXCAVATORS
Ball Engine Co.
Dull, Raymond W., Co.

FUSES
Ensign-Bickford Co.

GEARS
Caldwell, H. W., & Son Co.

GYPSUM-PLASTER
Best Bros. Keene's Cement Co.
Wheeling Wall Plaster Co.

HYDRATING MACHINERY
Kritzer Co., The
Miscampbell, H.
Schaffer Eng. & Equip. Co.

INDUSTRIAL CARS
Watt Mining Car Wheel Co.

LIME, HYDRATED
Scioto Lime & Stone Co.
Woodville Lime Products Co.

LABORATORY EQUIPMENT
Bausch & Lomb Optical Co.

LIME KILNS
Steacy-Schmidt Mfg. Co.
Vulcan Iron Works

LOADERS AND UNLOADERS
Gifford-Wood Co.
Jeffrey Mfg. Co.
Stephens-Adamson Mfg. Co.
Weller Mfg. Co.

LOCOMOTIVES
Fate Co., J. D.
Jeffrey Mfg. Co., The

MORTAR COLORS
Chattanooga Paint Co.

MOTORS, ELECTRIC
Gifford-Wood Co.

MOTOR TRUCKS
Federal Motor Truck Co.
Kissel Motor Car Co.
Pierce-Arrow Motor Car Co.
Sterling Motor Truck Co.
White Company, The

OIL ENGINES
Power Mfg. Co.

PAINT AND COATINGS
Chattanooga Paint Co.
Williams, C. K., & Co.

PERFORATED METALS
Chicago Perforating Co.
Hendrick Mfg. Co
Nortmann-Duffke Fdy. Co.
Johnston & Chapman Co.

PLASTER MACHINERY
Butterworth & Lowe
Dunning & Boschert Press Co.

PORTABLE CONVEYORS
Portable Mach. Co.

POWER TRANSMITTING MACHINERY
Caldwell, H. W., & Son Co.
Weller Mfg. Co.

POWDER
Atlas Powder Co.
Du Pont de Nemours Co., E. I.
Grasselli Powder Co.

PULVERIZED FUEL EQUIP.
Aero Pulv. Co.
Locomotive Pulv. Fuel Co.

SEPARATORS
The W. S. Tyler Co.

SCREENS
Dull, Raymond W., Co.
Gifford-Wood Co.
Johnston & Chapman Co.
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
The W. S. Tyler Co.

SHOVELS
Steam and Electric
Ball Engine Co.
The Osgood Co.

STEEL PROCESS
Stroh Steel Hardening Process Co.

TESTING SIEVES AND TESTING SIEVE SHAKERS
The W. S. Tyler Co.

WIRE ROPE
American Steel & Wire Co.
Leschen, A., & Sons Co.
Waterbury Co.

WIRE CLOTH
Audubon Wire Cloth Co.
The W. S. Tyler Co.

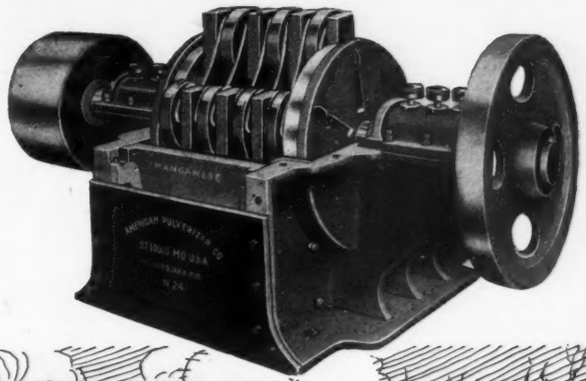
Agricultural Lime Stone for the Farmer

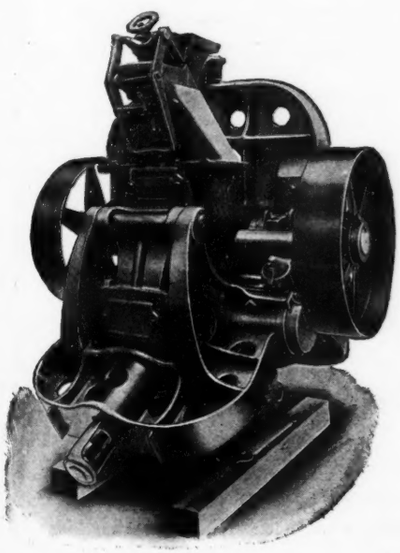
We guarantee power consumption, wear and tear, upkeep, etc., according to your proposition. Our patented feeder makes the operation of the

AMERICAN RING PULVERIZER

automatic. Smallest power consumption of any pulverizer made. A simple, powerful, automatic pulverizing machine, guaranteed to fit your needs will make limestone a profitable product for you. The market is continually increasing while limestone is declared an essential by the priority board. Write for prices and plans to

Buy a Guaranteed Machine





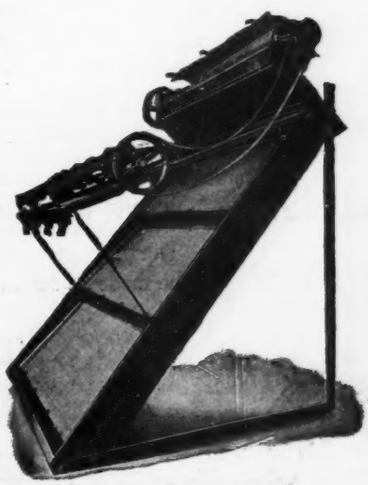
MAXECON MILL

Preliminary Grinder for Tube Mills

LIMESTONE .....20 to 40 Mesh
CEMENT CLINKER.....20 to 60 Mesh

MAXECON MILL PERFECTION SEPARATOR

The UNIT that has LARGER OUTPUT with LESS POWER WEAR and ATTENTION than any other.



It will be to the interest of those who operate CEMENT PLANTS to know what the Maxecon Unit will do.

Drop us a line. *We will be glad to tell you about it.*

KENT MILL COMPANY

10 Rapelyea Street BROOKLYN, N. Y.

THE WHITE COMPANY

Announces

A Double Reduction Gear Drive In Its Heavy Duty Trucks

Having all the flexibility and leverage of chain drive at its best. The superior leverage of a chain and sprocket, in applying power near the wheel rim by a rolling contact, is obtained in the Double Reduction axle by gears enclosed in the wheels and running in oil.

This is not an Internal Gear Drive with two axles. It is a *Centre Gear Drive* with power transmitted through gears on each end of a single axle. The entire load is borne by a compact housing. The axle shafts are carried in sleeves within the housing and are free to propel the truck without supporting any weight.

The twisting and jolting of uneven roads cannot cramp the driving mechanism. Wedging of gears is impossible.

THE DOUBLE REDUCTION PRINCIPLE

has been a large factor in the efficiency of White 1½—2-ton trucks, so widely used in both commercial and military service. It has long been an engineering problem to adapt it to shaft-driven, heavy-duty trucks. *This has now been accomplished without adding a single pound to the unsprung weight.*

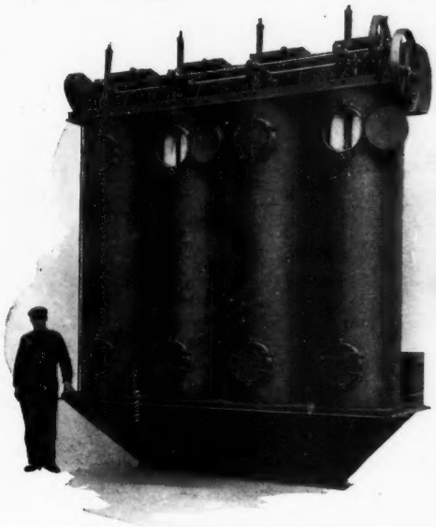
The chassis is clean cut. The rear axle housing is so compact it affords practically the road clearance of a straight axle. The tread is narrower. All parts are easily accessible. Moving parts are so simple and so rugged, dust protected and immersed in oil, that they are proof against rough usage. So frictionless is the whole driving system that the truck's coasting radius has been greatly extended.

White performance has been raised to a new level of efficiency. White operating cost has been lowered to a new level of economy, by a driving system which requires no adjusting whatever and will outwear the truck itself.

The new trucks have been in active service for several months. Deliveries will be made as soon as production in the factory overtakes urgent military needs.

THE WHITE COMPANY
CLEVELAND

Safeguard Men and Machinery



Keep your workmen satisfied with working conditions and reduce maintenance costs of your machinery by using an

ALLIS-CHALMERS DUST COLLECTOR

Its operation is effective and simple. The collection of dust is accomplished by filtering the air or fumes through cloth bags of special weave which are automatically cleaned at definite intervals discharging the residue into a hopper at the bottom of the machine.

Write for Bulletin 1454F

Our Name Is Your Assurance

Sales Offices in All Principal Cities

PATENTED

ALLIS-CHALMERS

Milwaukee. Wis. U.S.A.

To Determine Carbonates

—a New Method

The percentage of carbonates in limestone, fertilizers, baking powders and other materials can be determined ACCURATELY and QUICKLY with the

Barker Carbonate Apparatus

Any **unskilled user** can obtain results by this method that compare favorably with those of a skilled chemist using standard laboratory methods.

Apparatus is a hydrometer containing the sample, to which HCL is added. Decrease in weight accompanying consequent release of CO_2 is recorded on a scale as "percentage of carbonates" from which the gas escaped. No chemical balance required, and no long calculations to be made.

Designed by J. F. Barker, M. S., specialist in soils, Ohio State University, College of Agriculture, who personally tests and certifies each instrument before it is shipped to user.

Write for descriptive circular.

Bausch & Lomb Optical Co.

200 St. Paul St., Rochester, N. Y.

NEW YORK WASHINGTON CHICAGO SAN FRANCISCO

Manufacturers of Microscopes, Projection Apparatus (Balopticons), Photographic Lenses, Precision Glassware and other High Grade Optical and Laboratory Equipment.

Hercules (Red-Strand) Wire Rope

Back of every HERCULES (Red Strand) Wire Rope is a large modern factory, directed by experienced engineering and manufacturing departments, and operated by skilled workmen.

Reg. U. S. Pat. Off.

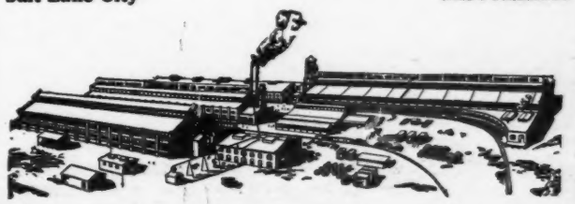
We make a study of Wire Rope working conditions, and are at all times glad to confer with you regarding your problems along this line.

WRITE US

A. Leschen & Sons Rope Co.

St. Louis, U. S. A.

New York Chicago Denver
Salt Lake City San Francisco



Saying "I saw it in ROCK PRODUCTS" will bring quick action.

UNCLE SAM'S TEST of HYDRATED LIMES

FAK/CE.

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

ADDRESS REPLY TO
BUREAU OF STANDARDS
40TH AND BUTLER STS.
PITTSBURGH, PA.

Pittsburgh Branch

July 19th, 1918.

Woodville Lime Products Co.,
Nicholas Building,
Toledo, Ohio.

Gentlemen:

On April 24th we reported to you results of tests made upon a sample of White Enamel Hydrated Lime received April 10th. The mortars described in this report have been tested for compressive and tensile strength after storing in air for 90 days with the results given below:

	Proportions by Weight	Strength Pounds per Sq. In. Compressive	Tensile
✓ White Enamel:	1:3	463	112
✓ " "	1:4	267	76
✓ " "	1:5	250	74
Ave. High Magnesian	1:3	324	67
Ave. High Calcium	1:3	244	49

White Enamel Mortars were remarkably strong. In every case they are the strongest of the mortars made from any of the 54 hydrated limes so far tested.

This completes the tests to be made upon this sample.

Thanking you again for your co-operation in this matter, we remain

Yours very truly,

A. T. Bleininger
For the Director.
FAK

THE WOODVILLE LIME PRODUCTS Co
TOLEDO ··· OHIO.